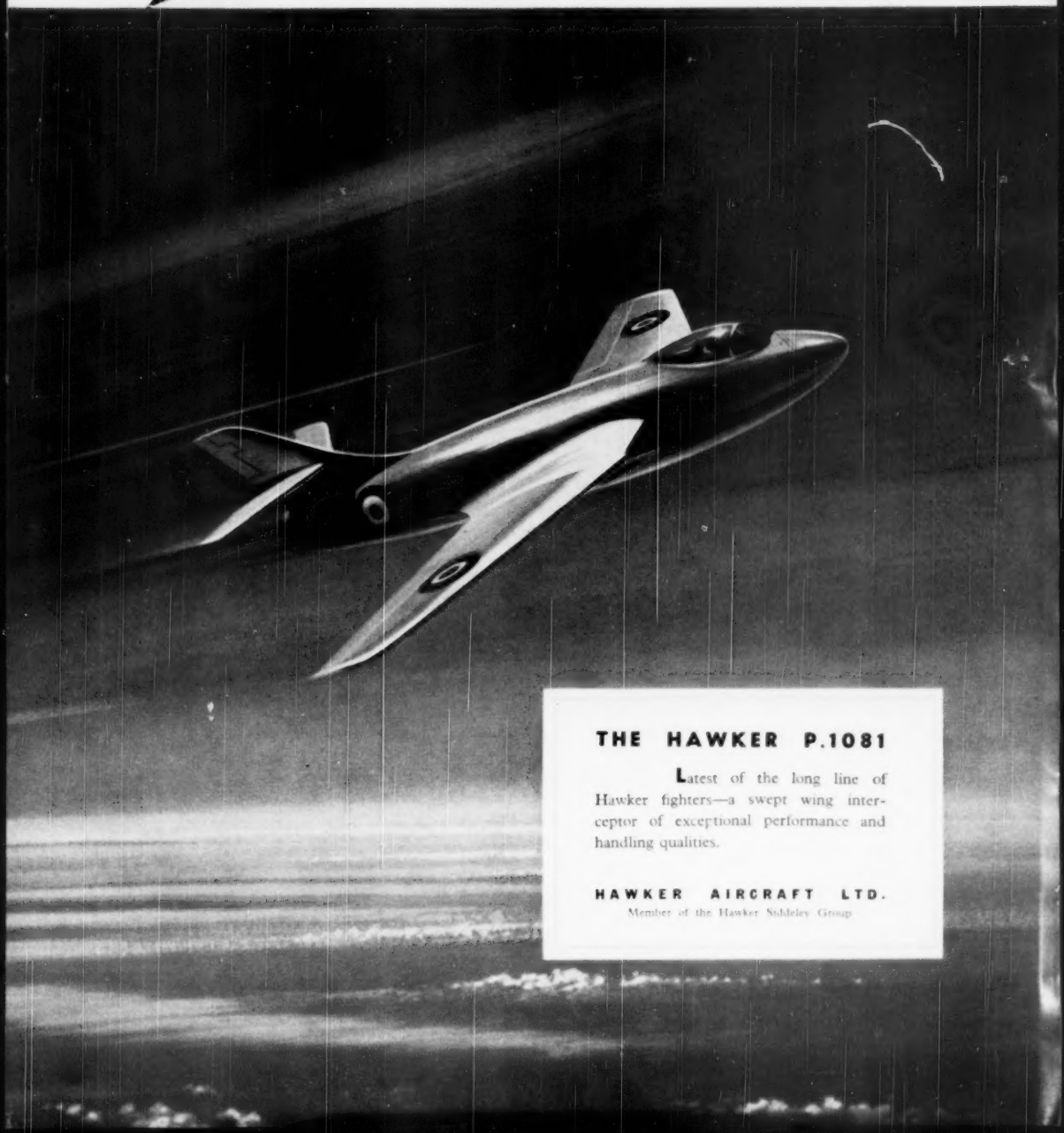
21 SEPTEMBER 1950 ONE SHILLING

FLIGHT

and

AIRCRAFT ENGINEER

OFFICIAL ORGAN OF THE ROYAL AERO CLUB



THE HAWKER P.1081

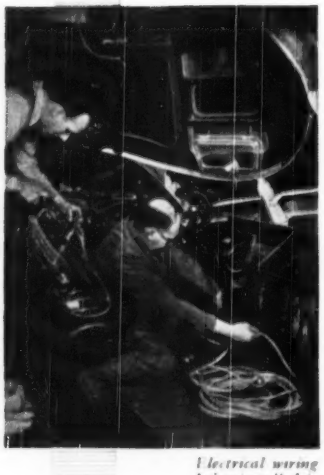
Latest of the long line of Hawker fighters—a swept wing interceptor of exceptional performance and handling qualities.

HAWKER AIRCRAFT LTD.
Member of the Hawker Siddeley Group

for all electrical services

The VICKERS VISCOUNT 700

RELIES UPON BICC AIRCRAFT CABLES



Electrical wiring being installed in Pilot's cockpit.

To take advantage of the increased power available with the new Rolls-Royce 1,400 s.h.p. "DART" RDa 3 Turboprops, Vickers-Armstrong have evolved the Viscount 700—a new variation of the basic Viscount airframe.

Silence and lack of vibration are special features of the new Viscount, while the larger fuselage, greater wingspan and fuel-capacity allow an increased payload.

For all electrical services, this aircraft has been equipped throughout with BICC Aircraft Cables.

B.I. Callender's

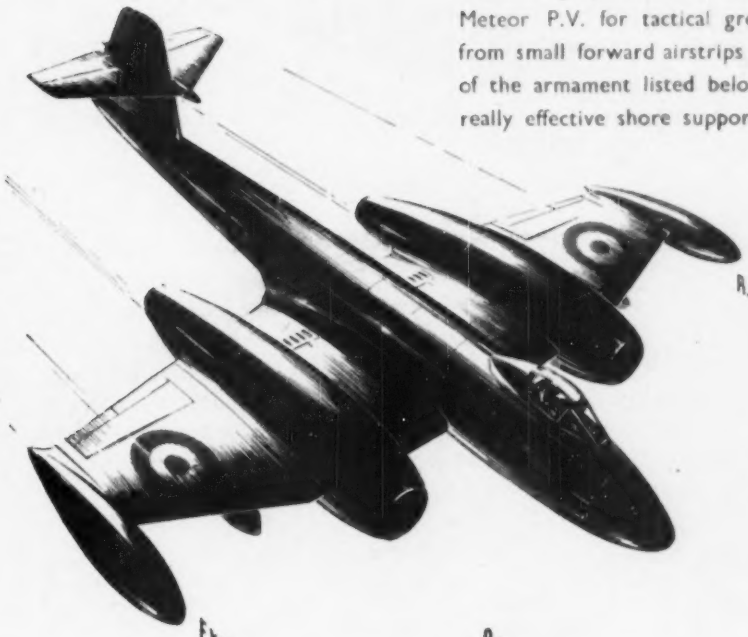
AIRCRAFT CABLES

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2

Newest Gloster development

GROUND ATTACK ARMAMENT WITH FULL METEOR PERFORMANCE

With wing-tip tanks, R.A.T.O.G., and arrester, this Meteor P.V. for tactical ground attack can operate from small forward airstrips carrying any combination of the armament listed below—essential features for really effective shore support.



R.A.T.O.G. & ARRESTER

1000 lb BOMBS

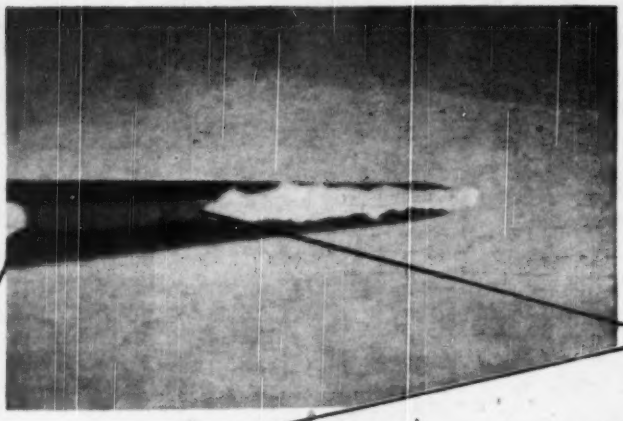
EXTRA CANNON

95 lb R.P.s.

GLOSTER METEOR P.V.

GLOSTER AIRCRAFT COMPANY LIMITED (Member of the Hawker Siddeley Group).

A1



A three-foot section of the new T.K.S. Porous Panel Distributor under test. Photo by courtesy of British European Airways.

Clear proof of the OUTSTANDING PERFORMANCE OF FLUID DE-ICING *shown by recent flight tests*

Flight tests last winter proved conclusively that the **new** T.K.S. "POROUS PANEL" AEROFOIL DISTRIBUTOR is by far the most effective medium for the distribution of de-icing fluid. As a result these Distributors have been recommended for the new Handley Page "Marathon". The improvements obtained may be summed up as follows :—

1 **100% fluid exuding surface** within the area of water catch resulting in complete prevention of ice adhesion.

2 **Smooth continuity of surface**—eliminating not only all ice-keying fixtures but also any possible drag effect.

3 **Overall reduction of weight.**

4 **Substantial de-icing fluid economy**—enabling the most severe conditions encountered to be adequately dealt with on flows of ¼ pint per sq. ft. of frontal area.

5 **Greatly simplified installation**—allowing fitment to existing aircraft.

T·K·S *Aircraft* DE-ICING EQUIPMENT

T.K.S. (AIRCRAFT DE-ICING) Ltd. Proprietors: Tecalemit, Kilfrost, Sheepbridge Stokes.

Drayton House, Gordon Street, London, W.C.1. *Telephone : Euston 4650* *Grams : De-icing Phone London.*

T.2506

Since the earliest days of aviation Titanine finishes have enjoyed a high reputation throughout the Aircraft Industry
TITANINE
FINISHES

TITANINE LIMITED

COLINDALE · LONDON · N.W.9

Telephone : COLindale 8123 (6 lines)

Associated Companies : Titanine Inc., U.S.A. ; N.V. Titanine, Holland ; Vernici. Titanine, Italy

Commercial Motor Exhibition
Earls Court, September 22-30
STAND 439

International Motor Show
Earls Court, October 18-28
STAND 510

In response to wide public demand for more technical facts and less damfoolery in Desoutter advertising we now explain in simple but quite incomprehensible terms how Desoutter Tools get to be the way they are. As every schoolboy knows, Desoutter Tools are lighter, smaller and more powerful than any small tools that are heavier, bigger and feebler. How come? Well, smatter of fact, it is due to a nurnber of things; the shape for instance and the fact that we keep putting more and better works inside the shape without increasing the size. And the air has something to do with it too. It stays cooler longer in Desoutter Tools. Curious isn't it? We must look into it. But chiefly, of course, the superiority of Desoutter Tools is due to our brains, which—though small—are ve-ry ve-ry superior.

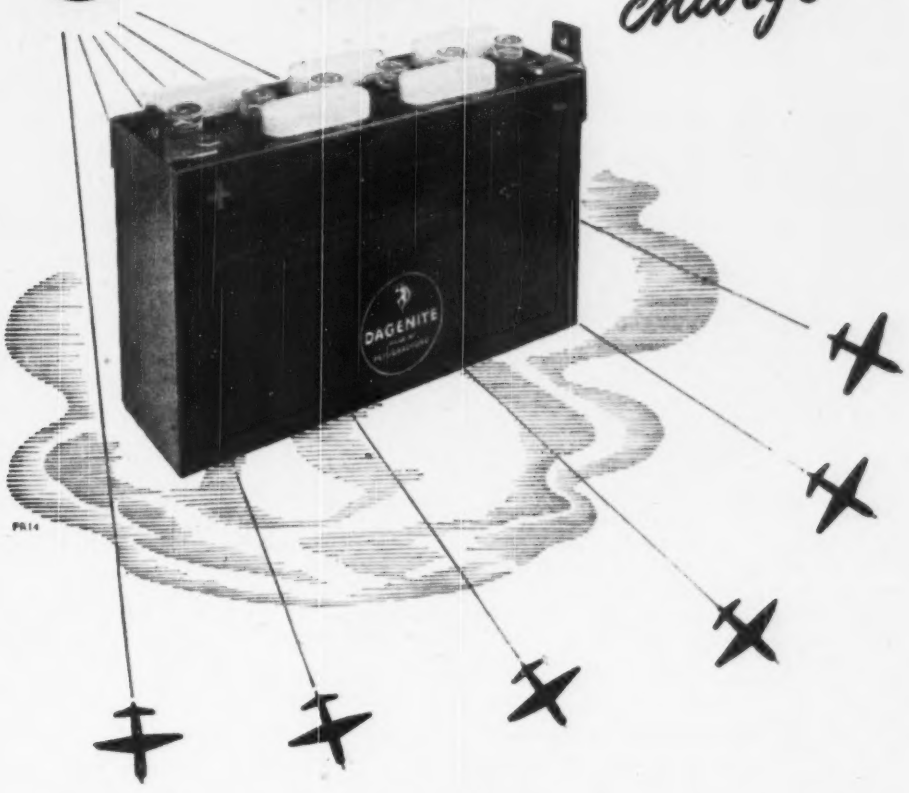
Desoutter

POWER TOOLS INCREASE PRODUCTION

DESOUTTER BROS. LTD., THE HYDE, HENDON, LONDON, N.W.9. TELEPHONE: COLINDALE 6346 (5 lines). TELEGRAMS: DESPNUCO, HYDE, LONDON.

ON THE DE HAVILLAND COMET...

6 Successive starts on one battery charge



Although ground starting of the jet engines is the normal procedure, these batteries have been specially designed to start the Comet from inside the aircraft when required. On test recently a fully charged 24 volt set of batteries gave six successive starts without any charge during the intervening 5-minute rest periods. An exceptional performance for a 60 ampere-hour battery weighing only 52½ lb.

DAGENITE AIRCRAFT BATTERIES

PETO AND RADFORD · 50 GROSVENOR GARDENS · LONDON · SW1

MUREX

GROUND POWER UNITS

for aircraft servicing and starting

Illustrated are some of the world famous aircraft which have been started by the Murex Ground Power Unit. This unit has been designed to supply electrical current for servicing and starting all types of aircraft including piston engine, turbo-jet and turbo-prop types. The unit has an engine-driven generator and eliminates the use of heavy service accumulators. The standard unit supplies a current of 600 amperes continuously at 28.5 volts for servicing and pre-flight checks and a peak current of approximately 1,200 amperes for engine starting periods. Other capacities are available. Please write for details.

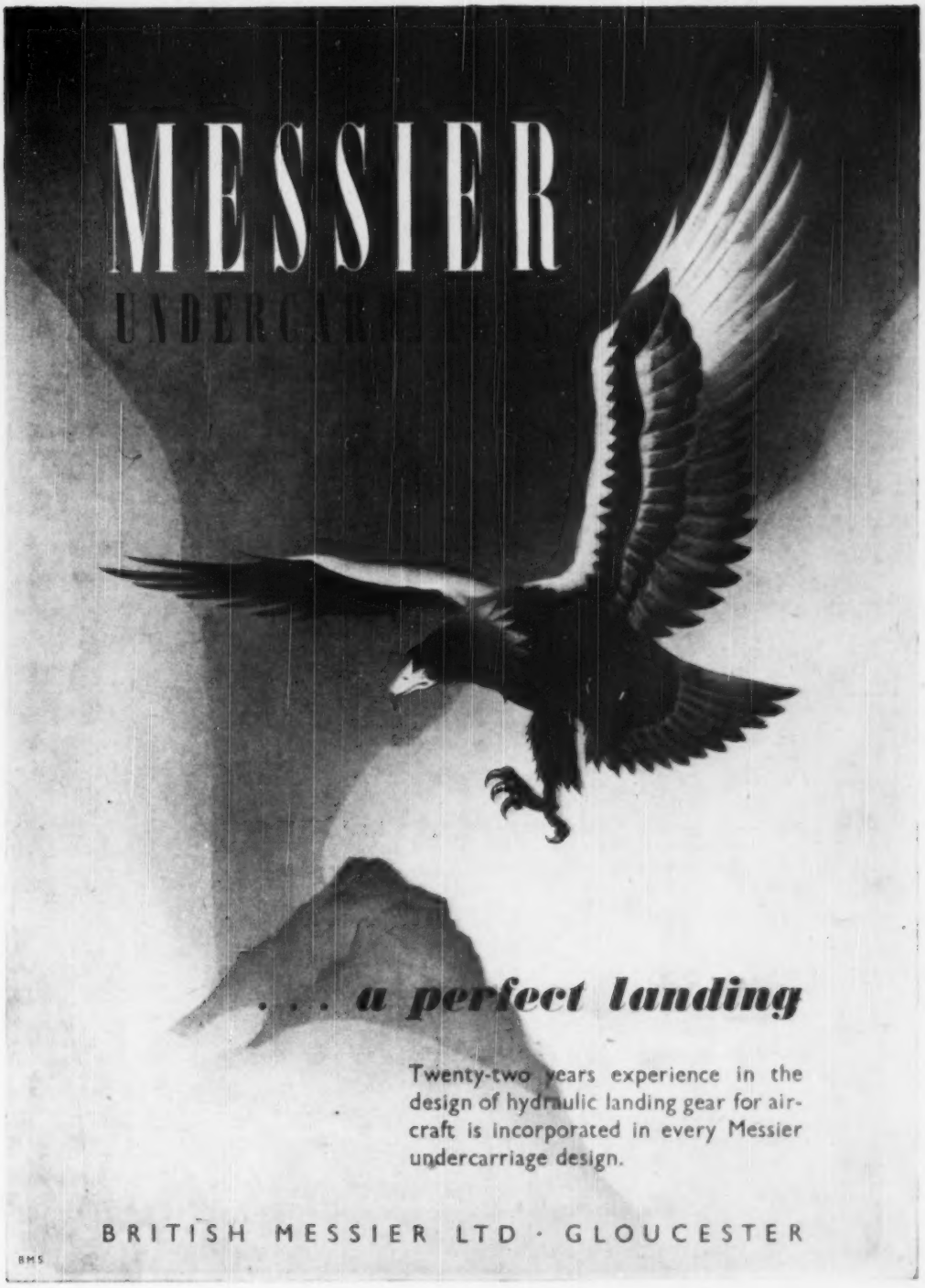
- ★ Supplies high current at constant voltage.
- ★ Starts piston, turbo-jet and turbo-prop engines.
- ★ Eliminates use of heavy service accumulators.
- ★ Self-starting engine.
- ★ Special controls.
- ★ Low trailer which passes under fuselage of all large aircraft.

MUREX

AIRCRAFT GROUND POWER UNITS

MUREX WELDING PROCESSES LTD · WALTHAM CROSS · HERTS.

Telephone: WALTHAM CROSS 3636


MESSIER
UNDERCARRIAGE
. . . a perfect landing
Twenty-two years experience in the design of hydraulic landing gear for aircraft is incorporated in every Messier undercarriage design.
BRITISH MESSIER LTD · GLOUCESTER
BMS

"SILVER FOX"
REGD. TRADE MARKS

"SILVER FOX"
STAINLESS STEELS

are

STRONG

"Silver Fox" Stainless Steel is an alloy steel, possessing great strength as a structural material, as well as resistance to corrosion. It is therefore especially suited to transport applications, where its strength allows it to be used in thin sections which cannot be weakened by corrosion in use.

SHEETS · COLD ROLLED STRIP · WIRE · BARS · FORGINGS

THE UNITED STEEL COMPANIES LTD

SAMUEL FOX & COMPANY LIMITED
Branch of The United Steel Companies Limited
STOCKSBRIDGE WORKS · NR. SHEFFIELD · ENGLAND

F236

...or 9 easy minutes with a Van Dorn "Junior" Electric Drill

Every drilling job you do by hand is costing you *in labour eleven times as much* as it would with a Van Dorn Drill! Figures are based on extensive tests with ¼" and ½" Junior models. The larger drills—up to 1"—are even more labour saving. Most models can be used with Hole Saws, or converted into powerful drill presses with Van Dorn Drill Stands.

"Van Dorn"

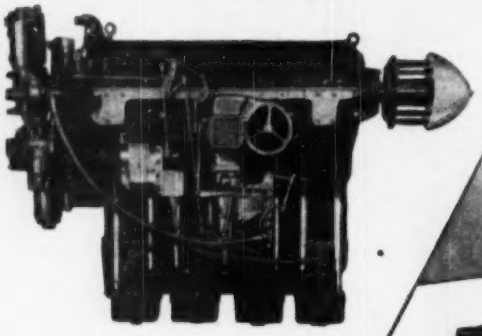
DRILLS · SCREWDRIVERS · VALVE REFACERS AND RESEATING EQUIPMENT · SHEARS · SANDERS BENCH & PORTABLE GRINDERS, ETC.

PORTABLE ELECTRIC TOOLS

Sold by leading Distributors everywhere

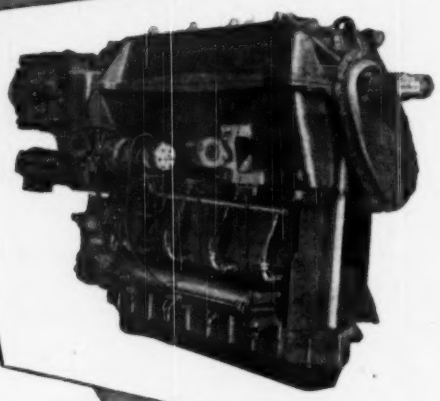
VAN DORN ELECTRIC TOOLS DEPT. L', HARMONDSWORTH, MIDDX. PHONE: WEST DRAYTON 2681/2
LONDON • BIRMINGHAM • BRISTOL • GLASGOW • LEEDS • MANCHESTER • NEWCASTLE • NOTTINGHAM
Smee'a

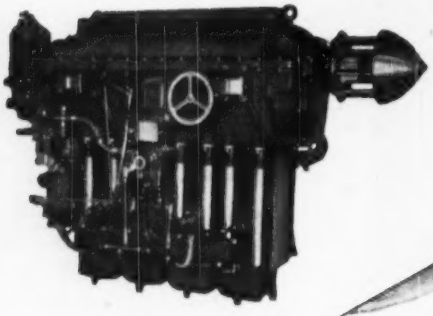
FOR HEAVY DUTY IN LIGHT AIRCRAFT-



MAJOR

A tough and compact, 4-cylinder in-line, air-cooled engine of proved performance. Series II develops 150 h.p. and Series III, of higher compression, 155 h.p.





BOMBARDIER

180 h.p. Latest of the line and first British Direct Petrol Injection engine to pass A.R.B. approval tests. One of Bombardier's main advantages is in giving *greater power for weight.*

MINOR

Series I, 90 h.p. ; Series II, 100 h.p. The Air Registration Board now permits Minor II to run for 800 hours before complete overhaul—*a gain of 200 hours.*

The reputation for performance, reliability and economy which Cirrus Engines have built-up over the years has gained them the unwavering confidence of the designer and user of light aircraft. That is why so many established light aeroplanes are powered by Cirrus and why so many new designs incorporate these famous units.

THE Cirrus REG'D TRADE MARK GROUP OF POWER PLANTS

BLACKBURN & GENERAL AIRCRAFT LTD., BROUGH, E. YORKS

CIRRUS

9BE/5

FASTER PROMOTION AND—

LONG SERVICE CAREERS

at the **NEW HIGHER PAY RATES**

THE NEW TRADE STRUCTURE recently announced for the Royal Air Force ground trades will greatly widen the opportunities that the Service can offer to present and future members. The benefits may be summarised as follows :—

Rank and pay will depend upon experience and individual ability rather than on mere vacancies.

The regrouping of over 100 different Trades into 22 Trade Groups will provide increased opportunities for advancement, and in most of them there will be the opportunity of reaching top rates of pay.

All qualified airmen will have the opportunity to sign on for long service careers up to the age of 55 *with prospects of pensions up to £5 a week.*

A skilled man in any Royal Air Force Trade will have the added opportunity to qualify for promotion as a technician in addition to normal opportunities.

NOW MORE THAN EVER THE R.A.F. IS A TARGET FOR MEN WITH AN AIM IN LIFE

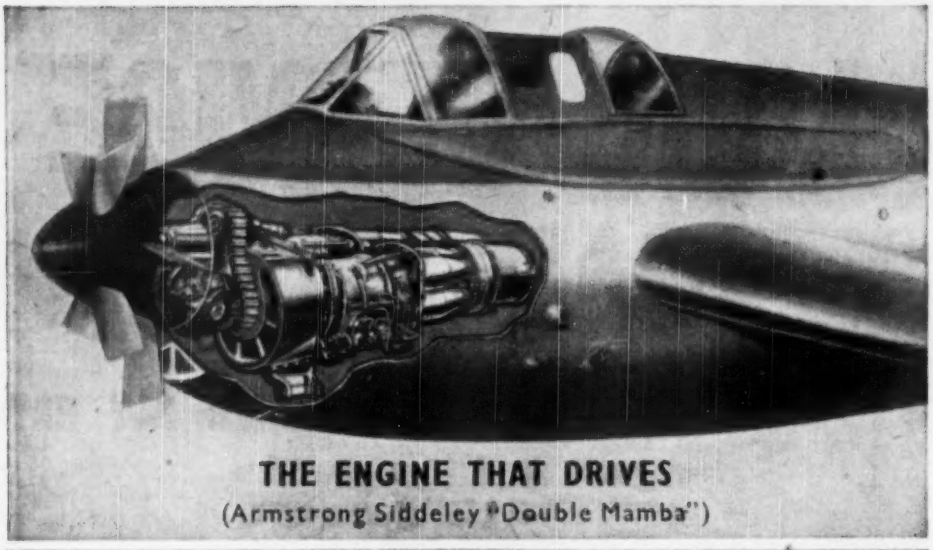
Send coupon now for further details

TO : AIR MINISTRY (F.R.12) VICTORY HOUSE, LONDON, W.C.2.

NAME .....

ADDRESS .....

..... AGE .....



THE ENGINE THAT DRIVES
(Armstrong Siddeley "Double Mamba")

THE AIRCRAFT THAT STRIKES
Twin Engine Performance—Single Engine Installation

TWIN-ENGINED · ANTI-SUBMARINE
CARRIER-OPERATED
FAIREY 17
THE FAIREY AVIATION COMPANY LTD., HAYES, MIDDLESEX

FLIGHT
and
AIRCRAFT ENGINEER

First Aeronautical Weekly in the World

Founded 1909

No. 2178. Vol. LVIII. THURSDAY, 21 SEPTEMBER 1950

EDITORIAL DIRECTOR
G. GEOFFREY SMITH, M.B.E.

EDITOR
MAURICE A. SMITH, D.F.C.

ASSISTANT EDITOR
H. F. KING, M.B.E.

TECHNICAL EDITOR
C. B. BAILEY-WATSON, B.A.

ART EDITOR
JOHN YOXALL

Editorial, Advertising and Publishing Offices :

DORSET HOUSE,
STAMFORD STREET,
LONDON, S.E.1.

Telegrams : Flightpres, Sodist, London.
Telephone : Waterloo 3333 (60 lines).

Branch Offices :

COVENTRY
8-10, Corporation Street.
Telegrams : Autocar, Coventry.
Telephone : Coventry 5210.

BIRMINGHAM, 2.
King Edward House,
New Street.
Telegrams : Autopress, Birmingham.
Telephone : Midland 7191 (7 lines).

MANCHESTER, 3.
260, Deansgate.
Telegrams : Iliffe, Manchester.
Telephone : Blackfriars 4412 (3 lines). Deansgate 3595 (2 lines).

GLASGOW, C.2.
26b, Renfield Street.
Telegrams : Iliffe, Glasgow.
Telephone : Central 4857.

SUBSCRIPTION RATES
Home and Overseas : Twelve months £3 1s. 0d. Six months, £1 10s. 6d. U.S.A. and Canada, $10.00.

BY AIR : To any country in Europe (except Poland). Twelve months, £5 1s. 0d. Six months, £2 10s. 6d. Canada and U.S.A. Six months, $16.

In this issue:

South Coast Race - - 316
These Were the First - 320
Static Show in Pictures - 323
Post-Farnborough Impressions . - - - - 328
Cargo-Carrier Concept 332
Over Africa - - - - 341

First Things First

LAST week the Battle of Britain was commemorated and proud memories were revived. Perhaps the greatest single factor in gaining that air victory with the very minimum number of aircraft and pilots was the singleness of purpose which at that time inspired not only the fighter squadrons but the whole nation.

Today, ten years later, we seem to have lost touch with much of the spirit of those vital days, and this at a time when history is grimly repeating itself. Things are now happening which the men of the Battle of Britain, and many others for the second time in a generation, sought to eliminate for ever. Once again there is a threat of aggression, and once again, because a renewed threat was unexpected and unimagined by all peaceable nations, our air defences are numerically depleted and inadequate. Though a concerted effort is at last being made to bring them up to strength, together with those of other Western Powers, the process must take a considerable time, for there appears to be no end to the complexity of military aircraft.

By comparison with the late nineteen-thirties, the defence picture is vastly different, and apart from the distances and areas which might now be involved it is unlikely that the productive capacity of the aircraft industry could, in proportion, be enormously increased as it was during the war years. Thus, the country needs to be better prepared at the start should another war be forced on her, and much greater reliance may have to be placed upon materials produced by the industry's daughter-firms in the Commonwealth, and by America.

If results are to be achieved quickly, every resource must be utilized and everyone must work to the same end. A clear-cut plan will be needed for the aircraft industry and its diversity of allied industries to avoid duplication and wastage of effort, and vital requirements must be selected upon which to concentrate. As in 1940, the officers and men of the R.A.F. are ready to do their share: but without the most modern equipment, in adequate supply, even their untarnished Battle of Britain spirit will not see the country through.

Freighters

FOR war and peace, specialized cargo-carrying aircraft, of the class frequently advocated by this journal, are at last coming into their own. Realization of numerous enterprising projects has been deferred in the post-war years by a legacy of hundreds of military transports, all more or less improvised, and all much inferior in earning capacity and convenience of handling to later specialized designs. The superiority of the Bristol 170 and Fairchild Packet (to cite the most notable instances) over older machines of their class is being demonstrated daily, and by the same token the huge G.A.L.60 seems destined for success.

In no field of aircraft design is there more scope for ingenuity. One of the latest manifestations of this is the Fairchild Pack Plane, discussed by Stanley H. Evans in this issue. To recall that a detachable pack, pod, or pannier was but one of several imaginative features introduced by Miles Aircraft in their little M.68 soon after the war in no way detracts from the achievement of the Fairchild engineering staff. Has not their own Packet been faithfully reproduced in France? But the French transports now on test are not exclusively imitations; in fact, some highly interesting developments—notably the double-decker Breguet, and a smaller, folding-fuselage type by the same makers—have been flown in France since the war. In general it may be observed, however, that the French freighters are intended for operation over relatively long ranges from full-size prepared airfields, whereas the short/medium-range G.A.L.60 and its projected civil counterpart, the Universal Freighter, will be suitable for short take-offs and landings from grass fields. In this they resemble the Ar232, though that design had a unique undercarriage which enabled it to ply its trade in terrains inaccessible to worse-shod machines.

Whatever the freighter requirements for the years ahead, British designers can be relied upon to meet them; but they must be clearly studied and stated.

COASTAL CONTEST

N. W. Charlton (Percival Proctor) Wins Challenge Cup and £1,050 in "Daily Express" Race

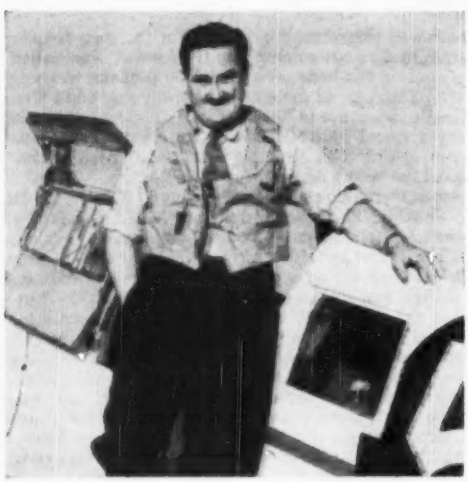
Illustrated by "Flight" Photographs

SIXTY-SEVEN aircraft took off from Hurn Airport, Bournemouth, last Saturday for the 200.6-mile South Coast handicap race, from Hurn, near Bournemouth, to Herne Bay, organized by the Royal Aero Club on behalf of the *Daily Express*. There were nine non-starters. The Brabazon and an "official" Sealand covered the course in advance.

The winning aircraft was a Percival Proctor I (Gipsy Queen II), flown at a speed of 164.5 m.p.h. by N. W. Charlton, a Sunderland motor-engineer; second was I. A. Forbes, flying a Miles Nighthawk (Gipsy Six II) at 175 m.p.h., and F/L. P. Raymond, D.F.C., took third place in a Miles Hawk Trainer III (Gipsy Major I) at 147 m.p.h. The *Daily Express* Challenge Trophy, and cash prizes totalling £2,350, were due to be presented by Lord Dowding at a Londonderry House reception yesterday. At the time of going to press, therefore, results are provisional.

The scene at Hurn—on less auspicious occasions the home of B.O.A.C.'s training activities—was characterized by the riot of colour provided by nearly eighty gaily painted racing and visiting aircraft. No less impressive was the feverish buzz of activity as crews hastened to affix last-minute sealing strips over cowling joints, give a little extra polish to already mirror-like wing surfaces, or add a cautious gallon of fuel.

The admonitions of the Clerk of the Course, Mr. D. S. Scoffham, and his assistants at the briefing session were heard by the competing pilots and quite a number of no less enthusiastic passengers. Duly enlightened on such points as how to locate the white-painted boats placed at the eleven "concave" turning-points on the course and how to cope with the unlikely contingency of all 67 aircraft crossing the finishing line at the same moment, pilots heard the good news that the weather was to be fair, with broken cloud above 2,000ft over the whole course. A strong south-westerly wind, although boosting ground speeds, would give somewhat bumpy conditions which could be avoided by choosing the correct height to fly. The need for a scatter-point was eliminated by selecting



The winner, N. W. Charlton, who brought his Percival Proctor in seven seconds ahead of the next competitor.

Before the start: An air view of Hurn from *Flight*'s Gemini.

Runway 26 for take-off, but a strong cross-wind, often gusting up to 25 knots, did not augur well for the lighter aircraft.

By 1.30 p.m. all machines were assembled at the eastern end of the runway and soon the mingled roar of well-tuned engines heralded the approach of the eagerly awaited moment. On the stroke of two o'clock the starter's flag fell and Mann's gallant old Gipsy Moth battled its way into the air. There followed what turned out to be almost a stream take-off, occasionally relieved by the breath-taking spectacle of two or three light aircraft "scrambling" in formation. On several occasions, due to the beam wind, their tracks crossed before the end of the runway was reached.

In spite of the difficult conditions few pilots seemed to run into any real trouble, although one could sympathize with G/C. Mole in his diminutive Chilton monoplane, whose evolutions amounted almost to aerobatics. One hour and seven minutes after the departure of the first Gipsy Moth, Murphy's Hurricane, *The Last of the Many*, disappeared low over the trees with a trail of exhaust smoke, and the race was well and truly on.

PROVISIONAL RESULTS

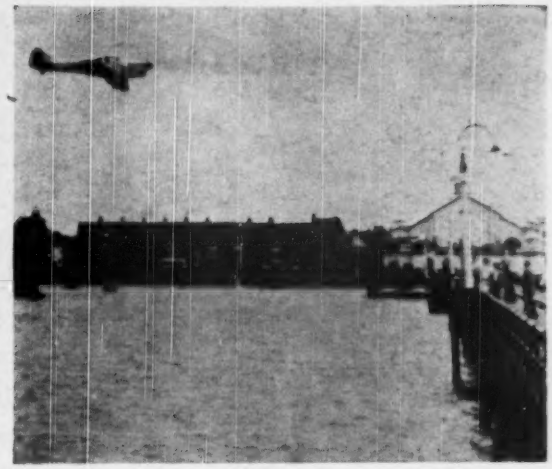
Pos.	Start Pos.	H'cap m.	H'cap s.	Pilot, Aircraft and Engine	Finished at 1 hr + m.	Finished at 1 hr + s.	Speed m.p.h.
1	48	30	40	N. W. Charlton (Proctor I, Gipsy Queen II)	44	01	164.5
2	54	35	00	I. A. Forbes (Nighthawk, Gipsy Six II)	44	08	175.0
3	34	22	30	P. Raymond (Hawk Trainer III, Gipsy Major I)	44	31	147.0
4	58	37	30	J. Rush (Falcon Six, Gipsy Six I)	44	33	180.0
5	26	19	00	R. E. Clear (Comper Swift, Pobjoy R)	44	35	141.0
6	6	07	40	G. Reid-Walker (Piper Super Cruiser, Lycoming O-235-C1)	44	41	124.8
7	64	61	45	H. Kendall (Marathon II, 2 Mamba I)	44	45	280.5
8	55	35	45	W. I. Lashbrook (Proctor III, Gipsy Queen II)	44	53	174.5
9	44	29	40	B. Collins (Proctor III, Gipsy Queen II)	44	58	160.0
10	21	16	50	P. Fillingham (Moth Minor Coupé, Gipsy Minor I)	45	08	137.5
11	46	30	10	S. G. Nicholson (Proctor I, Gipsy Queen II)	45	15	160.5
12	25	18	00	A. L. Cole (Comper Swift, Pobjoy R)	45	29	138.0

Prizes: 1st, *Daily Express* Challenge Trophy and £1,000; 2nd, £500; 3rd, £250. (See also Class Results on opposite page.)

Other Placings.—13, Miss J. L. A. Hughes (Fairchild Argus); 14, G. H. Miles (Aerovan); 15, R. R. Paine (Hawk Speed Six); 16, F. Dunkerley (Gemini); 17, E. J. Morton (Messenger); 18, A. E. Gunn (Balliol 2); 19, R. A. Mann (Moth); 20, E. Day (Hawk Trainer); 21, F. Murphy (Hurricane); 22, J. Oliver (Miles M.28-6); 23, dead heat between D. J. Jemmett (Proctor), C. A. N. Bishop (Hawk Trainer) and K. M. Freeman (Hawk Trainer); 26, A. N. Marshall (Halifax); 27, D. J. Bennett (Proctor).

28, R. E. M. B. Milne (Consul); 29, K. C. Millican (Proctor); 30, D. Lowry (Chrislea); 31, J. P. Crowther (Proctor); 32, H. T. Newton (Fairchild Argus); 33, D. McCaskill (Auster); 34, E. W. Westbrook (Messenger); 35, R. M. B. Ward (Hawk Trainer); 36, P. A. O'Sullivan (Auster); 37, A. E. H. Coltman (Tiger Moth); 38, W. M. Evans (Tiger Moth); 39, Miss L. Curtis (Wicko); 40, J. M. Williams (Consul).

41, V. H. Bellamy (Puss Moth); 42, P. Q. Ross (Tiger Moth); 43, J. H. Christie (B.H.T.1 Beauty); 44, E. L. Mole (Chilton); 45, W. H. Leadbetter (Messenger);



Forbes (Nighthawk) crossing Herne Bay pier to finish second.

46, Mrs. Z. Irwin (Proctor); 47, W. J. Twitchell (Hawk Trainer); 48, B. Gait (Moth); 49, T. W. Haythow (Auster); 50, D. E. Barton (Proctor); 51, J. K. Brown (Chipmunk); 52, J. Lignel (S.F.C.A. Lignel 46); 53, P. Hillwood (Gemini); 54, L. A. Strange (Taylorcraft); 55, F. W. Griffith (Leopard Moth); 56, Miss R. H. Sharpe (Rapide); 57, D. R. Robertson (Hirtenberg H.S.9a); 58, G. F. Bullen (Tom Tit); 59, C. G. Alington (Percival Q.6); 60, R. Rumbold (Miles Whitney Straight); 61, J. W. Beazley (Hornet Moth).

Class Results.

There were six aircraft-weight categories with, in each, a £50 prize for the highest placing on handicap and £50 for the best actual speed. Winners were: **Under 500 kg.**—Handicap, R. E. Clear (Comper Swift). Speed, J. M. Christie (B.H.T.I Beauty). **500-1,000 kg.**—Handicap, P. Raymond (Hawk Trainer). Speed, R. R. Paine (Hawk Speed Six). **1,000-1,750 kg.**—Handicap, N. W. Charlton (Proctor). Speed, J. Rush (Falcon Six). **1,750-3,000 kg.**—Handicap, G. H. Miles (Aerovan). Speed, C. G. Alington (Percival Q.6). **3,000-4,500 kg.**—Handicap, A. E. Gunn (Balliol 2). Speed, F. Murphy (Hurricane). **Unlimited.**—Handicap and speed, H. Kendall (Mamba-Marathon).

Fastest Actual Speed in Race.—F. Murphy (Hurricane IIc (Merlin 24)), 40 min. 5 sec., 300 m.p.h.

Progress of the Race

Unlike a closed-circuit race, this contest gave no individual observer the opportunity of watching progress, so its story is best related as it filtered into the "ops. room" on Herne Bay Pier, where Observer Corps personnel linked telephonically to 12 points on the course fed successive-leader information to the R.Ae.C. officials. The Goodhart brothers, of gliding fame, pored over a formidable chart while Peter Masefield and others wielded high-compression slide-rules, from which emerged the identities of ever-changing leaders on handicap, to be immediately broadcast by Charles Gardner.

The tale can be concisely told. The first aircraft away, the veteran Gipsy I Moth flown by R. A. Mann, was unchallenged until, somewhere between Hastings and Folkestone, it was caught by Reid-Walker's Piper Super Cruiser (handicap 7 min 40 sec), which had displaced Coltman's Tiger Moth (2 min 10 sec) from second place near Brighton. During this period of about 85 minutes the slide-rules said that the following, in succession, had taken the lead on handicap: George Miles (Aerovan), Collins (Proctor III), Clear (Comper Swift), Forbes (Nighthawk), Dunkerley (Gemini), Kendall (Mamba-Marathon), Murphy (Hurricane), Dunkerley again, and Charlton (Proctor). All were among the first 16 home.

From Folkestone onwards, as the field coalesced, the spotting system inevitably began to break down under the pressure. As the occupants of the ops. room tumbled out to the pier rails they knew only that it could be anybody's race.

Just before 3.45 a speck appeared skimming the waves to the east. It resolved itself into Charlton's Proctor with, coming up fast (but not quite fast enough) Forbe's Nighthawk about 400 yards behind. Many spectators missed this altogether, for their glasses were focused on a solid bunch of aircraft streaking for third place—Raymond's Hawk Trainer, Rush's Falcon, Clear's Comper Swift and Reid-Walker's Piper. They crossed the pier in that order, with ten seconds between first and last, and Hugh Kendall in the Mamba-Marathon about to pounce on all of them. Thereafter, for ten minutes aircraft came past in ones, twos and threes, some apparently intent on demolishing the pier, others weaving among the masts of some assorted pleasure-vessels that had charged out for a close look. The great race was over.

From Brighton Pier

Past the Palace Pier Mann's ancient Moth still held a clear lead, though Masefield and Co. presaged its defeat. Then, lower over the wind-flurried sea, skimmed Coltman's Tiger, to be followed (just as a theoretical lead for Clear's Swift was announced) by Giles Reid-Walker in his Piper. A many-hued gaggle now trickled before the physically chilled and mentally lukewarm assembly, only the Aerovans—higher than most, but more distinctive—arousing visible interest among the luckless anglers. Miss Curtis's Wicko and Bullen's Tom Tit showed up just as we heard that the Balliol was getting off from Hurn.

To a man, the anglers cocked a fishy eye as the Halifax loomed ponderously pierwards. Most people were so intent on this bulkiest competitor that the Balliol actually ahead of the Halifax) gave many their only near-thrill of the race, when its Merlin-roar suddenly reverberated from buildings which screened them from the wind.

The Winner

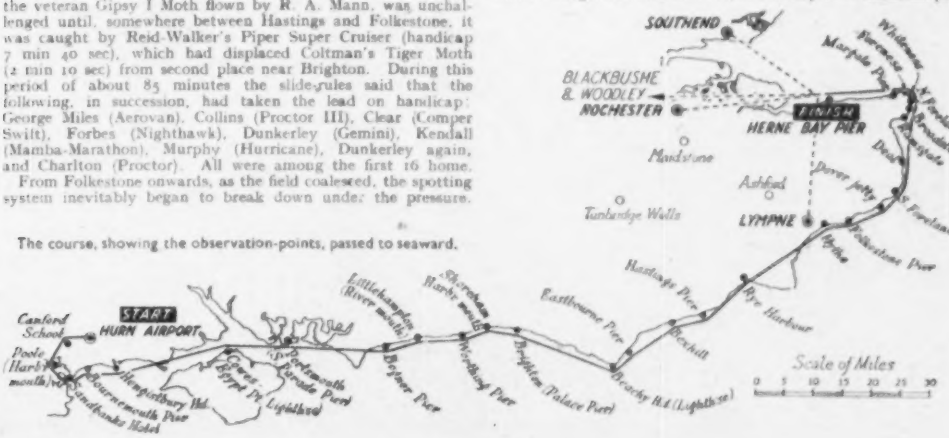
N. W. Charlton, the winner, took up flying in 1947, and his log-book shows 350hr. He is a member of the Darlington and Tees-side Flying Clubs. In the race—his first—he flew at wave-top height throughout, with his Proctor's air-speed indicator showing some 165 m.p.h. and the D.H. Gipsy Queen II running at 2,300 r.p.m. For the final two miles, the petrol-gauge flickered between two gallons and zero, but not until Herne Bay did the pilot risk changing tanks to use the five gallons remaining. Charlton's Proctor, painted cream and red and named *Nicodemus*, had received no special attention other than, in the engine, normal port-polishing and so forth. Its comparatively unpolished airframe surfaces must have chagrined many other competitors.

Race Briefs

Distinguished visitors at Herne Bay included Air Chief Marshal Sir Hugh Dowding and Lord Pakenham.

Four of the six aircraft which failed to complete the course, Somers' Gemini, Ryan's Hawk Trainer, Lofts' Messenger and Porteous' Autocar, turned into Lympne. Earlier retirements were the Aerovan—piloted by Cathels—which force-landed at Eastbourne and Ogilvy's Falcon, which went into Portsmouth.

The Nighthawk, a close second, is the only surviving aircraft of its type. Flown by Ian Forbes, assistant test pilot and sales manager of Miles Aircraft, it recently took a similar posi-



The course, showing the observation-points, passed to seaward.

COASTAL CONTEST . . .

tion in both the Kemsley and Norton Griffiths races. Ian Forbes told us there was "never a miss" from the Gipsy Six II engine, which ran at undisclosed r.p.m. to give an indicated speed of 182 m.p.h. at 1,000ft.

No. 3 Group, R.O.C., reported aircraft from Hurn to Southsea; No. 2 Group from Southsea to Hastings; and No. 1 Group from Hastings to Herne Bay. No. 1 Group (Maidstone) under Obs/Lt. N. D. Pinney, were in charge of the operation.

One keen overseas entrant who failed to reach Hurn in time was F/L. C. B. Contractor, of the Aero Club of India. When last heard of (on the Thursday before the race) his Bonanza—which might have proved a successful dark horse—was at Suez, gamely pressing westwards.

Murphy, who, appropriately enough in Battle of Britain week, made best actual time in the Hurricane, taking off from Hurn. His speed was 300 m.p.h.

Difficulty in securing A.R.B. approval was responsible for most withdrawals, although we heard of one apparently pessimistic entrant who sold his aircraft on the way to Hurn.

J. N. Somers fitted new props to his Gipsy-Gemini, but had no opportunity to test their effect before the race. They proved to be much more of a hindrance than a help, and he was eventually forced to retire.

Cockpit configuration was the main distinction between the various Hawk Trainers. F/L. Raymond's silver aircraft, which took third place, had a small hood sliding over a metal cone which faired off the rear cockpit. Twitchell's smart, scarlet Hawk Trainer sported a small Perspex bubble (actually a D/F. loop fairing) over the rear cockpit, but proved to be slower than E. Day's pale-blue machine (the 1950 King's Cup winner) with which it was handicapped.

R.A.F. "AT HOME" DAY

THOUGH appalling weather on Friday caused postponement, and then cancellation, of the London fly-past, commemorating the Battle of Britain, the elements relented sufficiently on Saturday to allow "At Home" days to go according to plan at 68 R.A.F. stations. Flying displays were given at most of them, and were seen by crowds estimated at a total of 675,000, compared with the 790,000 who visited 83 stations last year. A highlight of the London area events was a display of team aerobatics by seven Vampires of No. 72 Squadron, led by S/L. D. E. Kingaby—the largest number of jet aircraft ever to perform in formation. No. 54 Squadron's aerobatic team of five Vampires visited Biggin Hill and West Malling; three Vampires of 247 Squadron gave similar shows at Hendon and Halton. At Biggin Hill, Nos. 600 and 615 Auxiliary Squadrons gave their first public demonstration since re-equipment with Meteors. Hendon offered a large static exhibition in addition to aerobatics, fly-pasts, parachute jumping and "casualty evacuation," and there was a comparable programme at Hornchurch and Halton. Veteran aircraft were displayed at Henlow.

The Secretary of State for Air, Mr. Arthur Henderson, visited Castle Bromwich and North Weald during the afternoon, and Marshal of the R.A.F. Sir John Slessor called at Little Rissington and Odiham. The Under-Secretary, Mr. Crawley, watched the display at Benson.

Brief but typical reports from four of the stations follow.

Nearly 6,000 visitors watched a varied flying programme at Felixstowe, the home of the Marine Aircraft Experimental Establishment, where a highlight of the display was the aerobatic demonstration by three F-84 Thunderjets of the U.S.A.F. Other aerobatic performances were given by a Meteor from Waterbeach and a Harvard ("by request"). Launches, tenders and firefloats helped to give a nautical touch, enhanced by a fly-past of three types of flying-boat—a Sunderland, Seaford and Solent.

In spite of uncertain weather a record attendance of over 20,000 enjoyed a comprehensive afternoon's entertainment at Finningley. Meteor trainers, Spitfires, Harvards and Wellingtons of the F.R.S. joined with the Meteors of No. 616 R.Aux.A.F. Squadron to provide formations, aerobatics and some spectacular set-pieces. Army units, assisted by visiting Vampires, attacked and destroyed a strongpoint, and later in the day 616 scrambled to intercept two waves of Wellingtons attacking the airfield. Led by S/L. Holden, D.F.C., 616 then gave a neat formation display. The flying concluded with a mass fly-past of all the F.R.S. aircraft, led by S/L. W. Stapleton, and stream landings with as many as twelve aircraft on the runway at one time. On the ground a fine static park and hangar displays were open to the public, complete with a tractor "train" for visitors to tour in.

Saturday undoubtedly offered a unique experience to all those who visited Manby, for this was the first time the Royal Air Force Flying College had been "at home" to the public. It was estimated that nearly 6,000 saw the staff and students fly various types of aircraft, including Lincolns, Meteors, Athenas, Vampires, a Chipmunk and Mosquitoes, in polished formation, asymmetric and aerobatic displays.

A Tiger Moth was "stolen" by a "would-be pilot," much to the excitement of the schoolchildren present, most of whom had not previously seen this time-honoured act.

The whole of the station was thrown open to the public, including the college building, where instructional activities were shown, including a wind-tunnel demonstration, while films were viewed in the Instructional Wing cinema. The recruiting officer's stand was subjected to many enquiries, and questions were answered regarding pay and the new trade structure.

At Horsham St. Faith, near Norwich, in spite of the adverse weather forecast, 1 p.m. saw the crowds beginning to flow through the main entrance in a steady stream, and by 5 p.m. the gate was estimated at 16,000.

The opening address was delivered by Field Marshal Lord Ironside, and the entire programme proceeded as planned. The static display included a variety of aircraft types and a layout of technical and safety equipment.

Highlights of the afternoon's flying included a polished display of Meteor aerobatics by F/L. M. Scannell, A.F.C., and a bombing attack on "enemy tanks" by two Tiger Moths. The flying display was rounded off by yet another admirable performance by the Farnborough formation aerobatic team, led by S/L. J. W. Foster, D.F.C.

FORTHCOMING EVENTS

Sept.	23.	Helicopter Association: Annual Dinner and Lecture, "7,000 Hours of Autorotative Flight", by R. von Bahr.
Sept.	23.	Unveiling of Air Transport Auxiliary Plaque in St. Paul's Cathedral.
Sept.	23.	Bristol and Wessex Aero Club and Airways Flying Club: Garden Party, Whitchurch.
Sept.	24.	Association of British Aero Clubs and Centres: Summer Convention, White Waltham.
Sept.	28.	R.Ae.S.: Sixth British Commonwealth and Empire Lecture: "Some International Aspects of Air Transport." By Sir George Cribbett, K.B.E., C.M.G.
Oct.	3.	R.Ae.S. (Belfast): "Industrial Applications of the Gas Turbine", by G. L. Duffer, M.A.
Oct.	5.	R.Ae.S. Graduates: "Resonance Testing and Flutter Calculations for Fighter Aircraft," by C. P. Plantin, B.Sc., A.F.R.Ae.S.
Oct.	10.	R.Ae.S. Section Lecture: "Problems of High-speed Flight," by Prof. G. T. R. Hill, M.C., M.Sc., F.R.Ae.S., M.I.Mech.E.
Oct.	19.	R.Ae.S.: "Wind Tunnel Model Data," by R. Hills, B.A., A.F.R.Ae.S.

COMMAND OF THE SEA. Consider the value to a maritime country of a strong, well equipped reconnaissance force. Strategically located squadrons of Avro Shackletons can patrol vast areas of coast line and ocean, giving protection to vital sea routes, harbours and installations. The Shackleton with its extreme range, its modern navigational equipment, its powerful armament and devastating bomb load, is fully "briefed" for maritime reconnaissance.

AVRO

Shackleton

A. V. ROE & CO., LTD., MANCHESTER · MEMBER OF THE HAWKER SIDDELEY GROUP

The de Havilland propellers now in service on Vickers Vikings throughout the world are approved by the Air Registration Board for 1,000 hours of operation between overhauls

DE HAVILLAND PROPELLERS

DE HAVILLAND PROPELLERS LIMITED, HATFIELD, ENGLAND

Guests watching the flying display from the President's enclosure.

V.I.P.s' ENCLOSURE

"Flight" Pictures of Show Personalities

Mr. J. P. Bicknell, Sir Archibald Rowlands and Sir Roy Dobson.

Mr. W. T. Gill, president of the S.B.A.C., with Mr. C. C. Vinson.

Air Marshal Sir Alec Coryton and Air Marshal Sir William Elliot.

Sir James Barnes with Air Chief Marshal Sir James Robb.

Lord Brabazon of Tara with Col. W. C. Devereux.

Captain K. J. G. Bartlett, M. Pinet and M. Breguet.

Vice-Admiral Sir Michael Denny and Admiral Sir Cecil Harcourt.

Mr. R. P. Powell and Admiral Sir Charles Daniel.

The three Curtis NC-4 flying boats starting their Atlantic flight from Newfoundland in 1919. The aircraft flown by Cdr. A. C. Read, U.S.N., was first to complete the crossing.

THESE WERE THE FIRST

Pioneers Who May Have Been Forgotten : Some Highlights from Earlier Aviation History

By ROBERT CARLING

EVEN for a person with the most reliable and well-stored memory it is a salutary experience to make an occasional effort to do some historical research. It is certain to produce some interesting surprises—and particularly so in aviation, the pursuit of which tends to give one firm convictions which are the result of wishful rather than objective thinking.

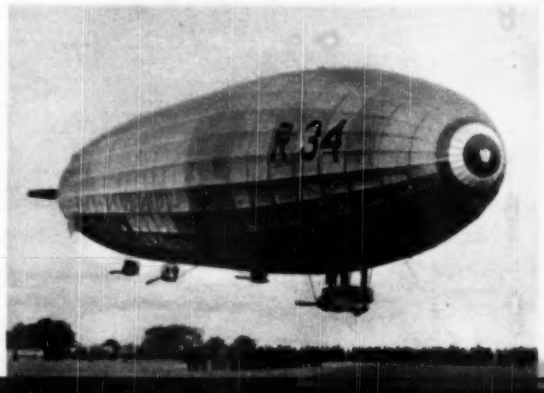
In the matter of aviation history, conversational statements are all too often at variance with the facts, and I have no doubt that one or two of the facts in this article, however carefully checked, will provoke hot denials and corrections.

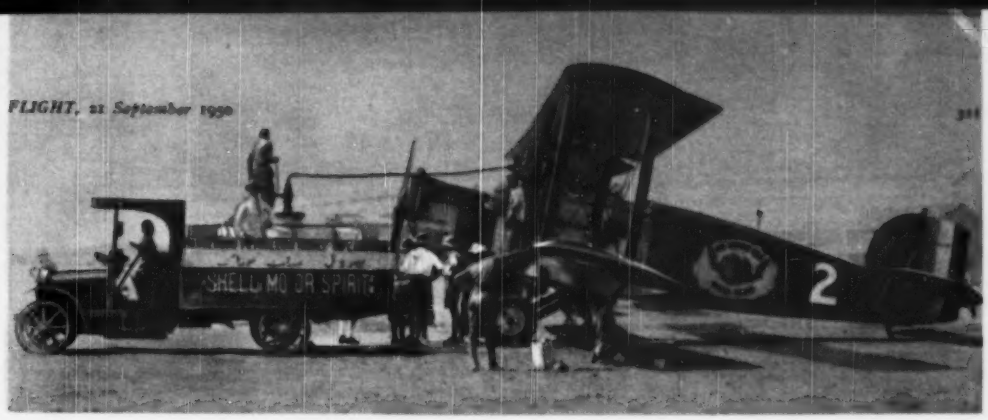
In truth, it all began a few weeks ago when I read somewhere that the *Graf Zeppelin* was the first passenger-carrying airship and that the first flight to the Cape was made in a Vickers Vimy. At the time I felt a conviction that there had been some earlier passenger-carrying Zeppelin, and that the Vimy flight had not been quite as straightforward as all that. So the idle research started with the help of a few books which had been written in the earlier days of aviation.

To satisfy curiosity straight away, I may say that I discovered the first "airline" airship to be, in fact, the LZ-7 of 1910. It was used for sightseeing trips and—though I have nothing but a faint memory of back numbers of *The Sphere* to support the idea—I think it ended its life uncomfortably in an accident, but without loss of life. [With a crew of 12, and 33 passengers, it ran out of fuel after a nine-hour flight and was force-landed on trees; there were no casualties.—Ed.] The first Cape Town flight (in March, 1920) certainly started and even continued with a Vickers Vimy, but the last stage of the journey was completed in a D.H.9. Two Vimys were used. The first was written-off in a night forced-landing at Korosko and the second on a high-altitude overload take-off at Bulawayo. No take-off runs for I.C.A.N. plus thirty at four thousand feet were pre-calculated in those days. Sir Pierre van Ryneveld and Maj. Brand (now A.V-M. Sir Christopher Quintin Brand) were thereupon offered the loan of a D.H.9 with which they completed the journey.

But let us begin at the beginning. Disregarding our old friends Icarus, Bladud, Oliver of Malmesbury and the others (who may, or may not, have dashed themselves down, on inadequate supporting surfaces, with an acceleration of thirty-two feet per second per second) the first persons who can decently be said to have travelled without any very obvious means of support were Pilâtre de Rozier

The British airship R-34 made a double Atlantic crossing in July 1919, under the command of Maj. G. H. Scott.





One of the Douglas *World Cruisers* refuelling at Karachi in August, 1924. Three of the four eventually completed a world flight.

and the Marquis d'Arlandes in a Montgolfier hot-air balloon towards the end of 1783. During the flight the balloon quietly smouldered from time to time and the incipient fires were put out with the help of a sponge. Interestingly enough, the first hydrogen balloon ascent was made only a month or so afterwards by J. A. C. Charles and A. J. Robert, and de Rozier was killed a year or two later when he tried explosively to combine in one balloon the advantages of each type.

Certainly, the one date about which there never seems to be any serious admission of doubt is that of the first man-supporting flight by a power-driven heavier-than-air machine. Throughout the world—except possibly in France, where the 1890 claims of Clement Ader with a steam-driven aircraft are still made—it seems to be generally admitted that Orville Wright has the honour with the date of December 17th, 1903. Even so, power-driven aircraft had actually flown before that date, both in model and full-scale, but not personally conducted, form, and Otto Lilienthal had been making controlled hill-top glides before 1895. Indeed, Lilienthal, Chanute and Pilcher had been experimenting on lines which were very much more in keeping with the later idea of what an aircraft should be. So much so that it is sometimes difficult to see quite how the Wright Brothers got round to their particular conception of a flying machine—unless one assumes that they worked from first principles and, so to speak, imagined how a successful aircraft might be made if one had never seen a bird.

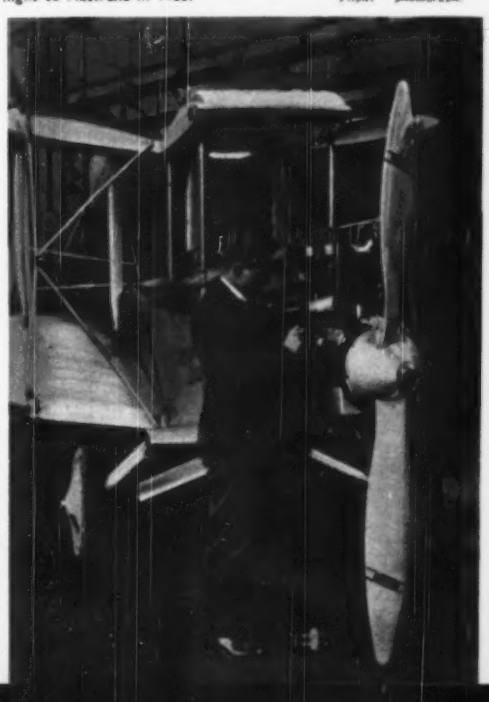
Of course, the happy hunting ground of the aviation quiz expert is Atlantic history. Nothing could be more smug than the voice of the Englishman when he patiently explains to some American that about sixty people had crossed the Atlantic by air before Colonel Charles Lindbergh in his Ryan monoplane. So superior is his feeling, in fact, that he is inclined to forget to mention the very first air-crossing—by Lt.-Cdr. A. C. Read of the United States Navy in the NC-4 flying boat about a month before Sir John Alcock and Sir Arthur Whitten Brown made the first direct crossing from Newfoundland to Clifden, Galway, Ireland. The NC-4 was taken from Newfoundland, via the Azores, to Lisbon, and thence to Plymouth. It was, nevertheless, the first crossing, if not as spectacular as the direct fifteen-hour Vimy trip to Ireland, or the capital-to-capital flight, solo, by Lindbergh eight years later.

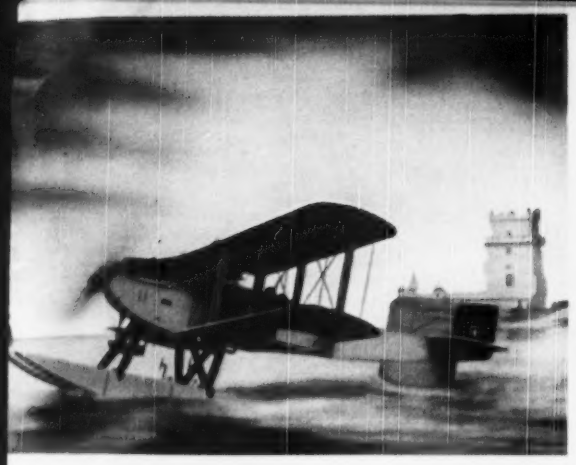
While we are thinking about it, it would be as well to explain the cryptic "sixty people" for the benefit of those who have forgotten one or both of the two airship crossings. The first of these was, of course, that of the R-34 and it was made in each direction less than a month after the Vimy flight. Major G. H. Scott and his crew of about thirty took the ship from East Fortune, Scotland, to Hazlehurst, Long Island, and returned five days later to Pulham in Norfolk. No wonder the airship was then, and for many years afterwards, considered to be the only practical way in which long-distance passenger flights could be made. It was more than five years later, in October, 1924, that a second airship crossing was made, by Dr. Hugo Eckener and his crew with the ZR-3, later named the *Los Angeles*. The building of this airship was allowed by way of reparation for the destruction of the Zeppelin fleet after the 1914-18 war, and the flight from Friedrichshafen to Lakehurst, New Jersey, was merely its routine delivery to the United States.

Earlier in 1924 a flight of four Douglas single-engined biplanes, specially made for the trip and labelled *World Cruisers*, had attempted a round-the-world flight under the leadership of Major P. L. Martin. Three of them completed the journey after a wearing series of incidents in an elapsed time which would hardly have done credit to a tramp steamer. But this, again, was the first flight of its kind and much of the journey was over stages where no reasonable facilities were available. The journey took, in fact, nearly half a year and the time was handsomely beaten five years later when the *Graf Zeppelin* made the circuit, using the very long hops of which only the airship was then capable, in a little over twenty-one days.

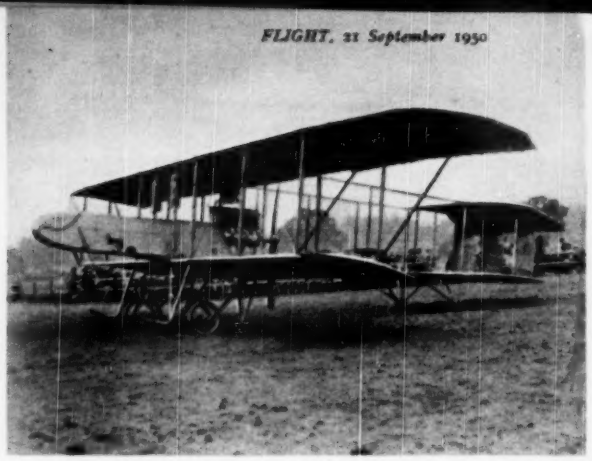
It was left to that miracle of endurance, Wiley Post, to bring the round-the-world time down to something like a week. First with Harold Gatty as navigator in 1931, and then, using the same Lockheed Vega single-engined high-wing monoplane, alone (except for a Sperry automatic pilot) in 1933. The Vega was no child's aircraft and the airfields on the trip were none too big; to bring this un-

S/L. "Bert" Hinkler preparing his Avro Avian for his notable flight to Australia in 1928. "*Flight*" photograph.





Pioneer South Atlantic crossing : one of the three Fairey IIIc seaplanes which, flown successively by two Portuguese pilots, took part in a crossing from Brazil to Lisbon in 1922.



Grahame-White's "Charabanc" which, before the First World War flew from Hendon to Brooklands with 11 people on board—on the power of a 100 h.p. Green engine. "Flight" photograph.

THESE WERE THE FIRST . . .

flapped, clean machine in for a landing required a concentration which would not be very easily conjured up after a week or so of sleeplessness.

With the steady succession of records on the Empire routes during the 'thirties one is inclined to forget some of the earlier and much more difficult flights. Who, for instance, remembers the first through flight to India by S/L. A. C. S. MacLaren in a four-engined Handley Page soon after the 1918 armistice? This was made a year before Sir Ross and Sir Keith Smith succeeded on a through flight in a Vimy to Australia in a trip which took a day or two less than a month. And who remembers the first solo flight to Cape Town by F/L. R. R. Bentley in a D.H. Moth (1927) or, in the following year, the fifteen-and-a-half-day solo journey to Port Darwin by S/L. H. J. L. Hinkler in an Avro Avian? Or, for that matter, the slower businesslike return journeys, both to Australia and South Africa, by Sir Alan Cobham in a D.H.50, using the aircraft as a floatplane in the first case and as a landplane in the second?

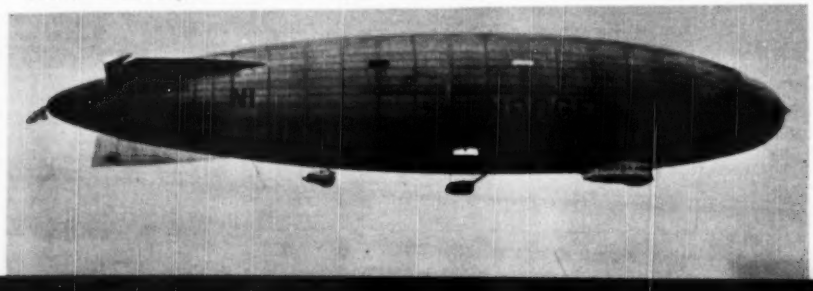
Again, we are inclined to forget about the South Atlantic and its pioneers. Long before Hinkler made the first solo crossing, and even before the succession of Aeropostale experimental air-sea mail flights, the South Atlantic had been crossed. First, by stages, when two Portuguese pilots, using, in succession, three Fairey IIIC seaplanes (two of which were wrecked, one on St. Paul's Rock) reached Brazil from Lisbon in 1922. Later, the first direct crossing was made by Dieudonné Costes and J. le Brix with a Breguet in 1927 from Senegal to Natal.

Since one can pretty well walk across the Bering Strait and, when the inevitable bad weather permits, hop from island to island in the Aleutians between Dutch Harbour, Alaska, and Kamchatka, Siberia, the first Pacific flight is not so easy to record. In the course of their world flight the Douglas biplanes certainly crossed the northern end of this ocean, but the honours for the first direct crossing must go to Sir Charles Kingsford Smith, who, with C. T. P. Ulm and two other crew-members, took a Fokker F.VII from Oakland, California, to Brisbane, via Honolulu, Fiji and Sydney in 1928. Later in that year, with the same aircraft and crew, he made the first Tasman Sea crossing between Australia and New Zealand.

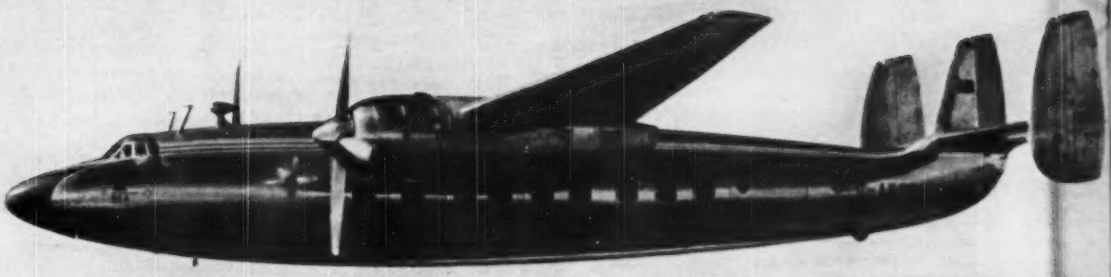
And let us not forget the few Polar flights—or that the very first attempt to reach the North Pole by balloon was made in Victorian days. Andrée's balloon, *Eagle*, in 1897, got no further than some two hundred miles from the starting point in Spitsbergen and it was thirty-three years before evidence, in the form of diaries and, most remarkable of all, an undeveloped negative, was found (accidentally by a whaling party) to confirm what had happened to his party. The picture, clear and unbelievably tragic to look at, shows a half-collapsed balloon envelope and an upturned basket on a wilderness of ice. Two figures stand pathetically beside the useless paraphernalia of aerostation and one wonders whether they knew, when the picture was being taken, that they could not possibly survive.

Nearly thirty years were to pass before the North Pole was finally to be reached by air. In 1926 Admiral Richard Byrd beat Amundsen to the Pole by a matter of two days—just as Amundsen had beaten Scott to the South Pole so many years before. Byrd was piloted by Floyd Bennett in a Fokker F.VII, while Amundsen had been flown, with Lincoln Ellsworth, in the airship *Norge* commanded by General Nobile, who was to make another trip to the Pole in the airship two years later. It was Byrd, too, this time flown by Bernt Balchen in a Ford Trimotor, who was the first to reach the South Pole in 1929 from rather grandly named Little America. No one will pretend that a few hours' flight—however uncomfortable the consequences of failure—terminating with a rapid navigational calculation (which might or might not be correct) is in any way comparable with the months of endeavour by previous Polar explorers, but the performances, nevertheless, have their place in history.

It is hardly possible to do more than touch on the scores of pioneer flights which a little easy research may bring to light. These are just a few of the high-lights taken almost at random. Perhaps they will serve to remind us all of others. Which, for instance, was the first aircraft to carry more than the odd passenger or two? Grahame-White's or Sikorsky's? And when did an aircraft first carry as many as forty passengers? I believe the answer to the last question is the four-engined Handley-Page V/1500 which flew for half-an-hour with that number of passengers on November 15th, 1918. But I may be wrong.



The airship *Norge*, in which Gen. Nobile, Amundsen and Lincoln Ellsworth reached the North Pole in 1926.



The Ambassador's wide range of economical cruising speeds will show very real advantages in regular service. A scheduled journey-time can in fact be maintained against a 30-m.p.h. headwind on all stage lengths below 900 miles

AMBASSADOR

AIRSPEED LIMITED · CHRISTCHURCH AND PORTSMOUTH · HAMPSHIRE

In association with the de Havilland Enterprise

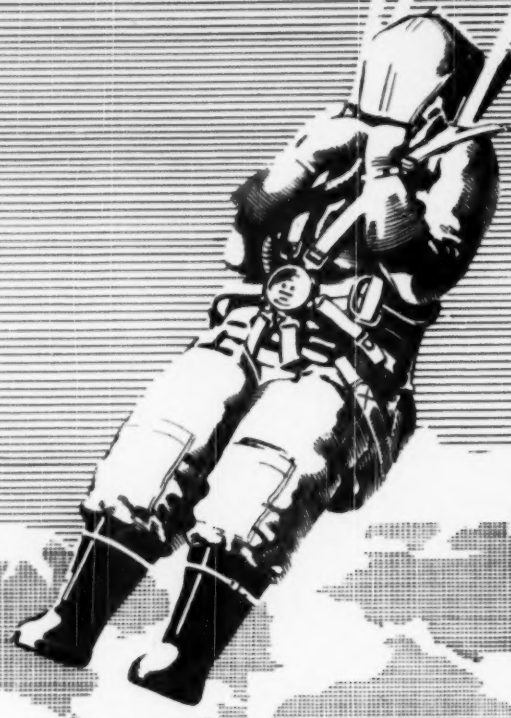
AUTOMATIC

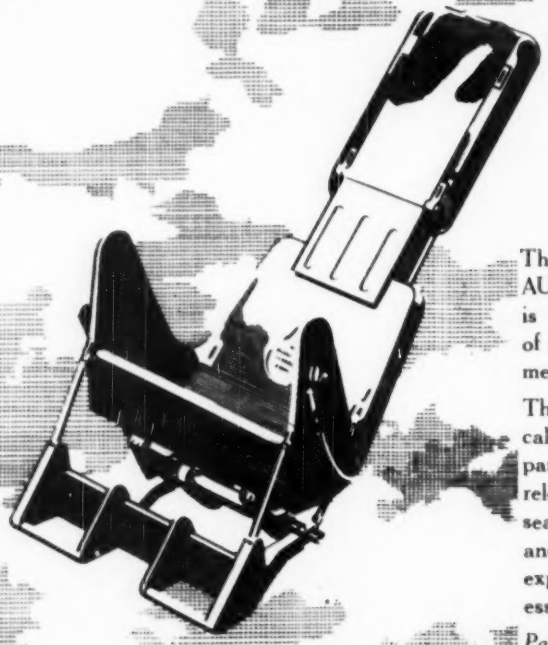
Ejection Seats

MARTIN BAKER

AIRCRAFT CO · LTD

HIGHER DENHAM NR UXBRIDGE
MIDDLESEX ENGLAND

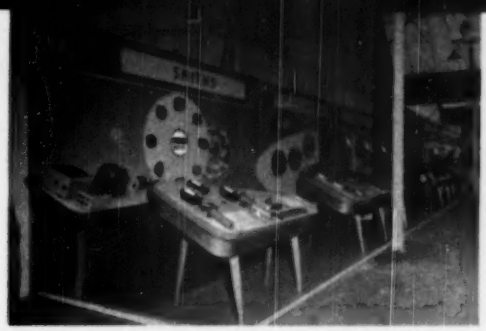




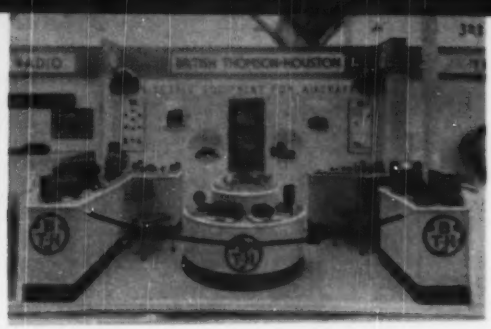
The MARTIN-BAKER PATENT AUTOMATIC EJECTION SEAT is the result of nearly six years of intensive research and development work.

The seat is fitted with barostatically controlled automatic opening parachute and automatic harness release, combined parachute and seat harness, manual over-ride and all those features which experience has proved to be essential.

Patents applied for in all the principal countries of the world.



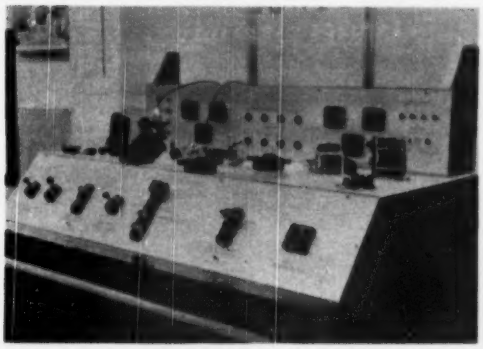
Grouped exhibits of Smiths, Kelvin and Hughes and K.L.G.



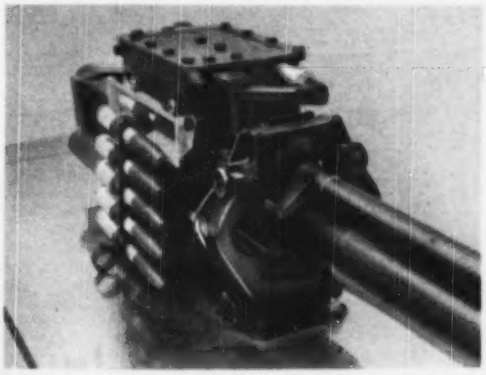
B.T-H. exhibits. Among various electrical items are, on the right, the electronic ignition tester for multi-cylinder engines and the new halogen vapour leak detector for checking pneumatic systems. Standard Mazda lamps for aircraft lighting can be seen at the rear.

STATIC SHOW IN PICTURES

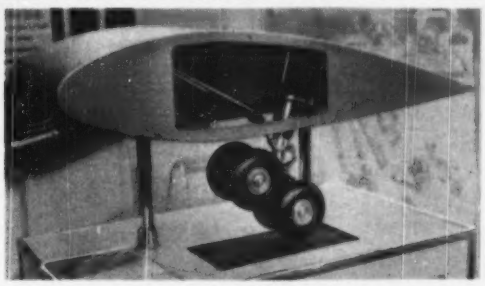
(Illustrated Mainly with "Flight" Photographs)



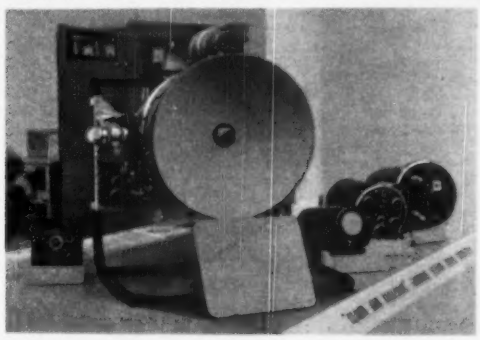
Display panel featuring examples of Dowty electrical equipment.



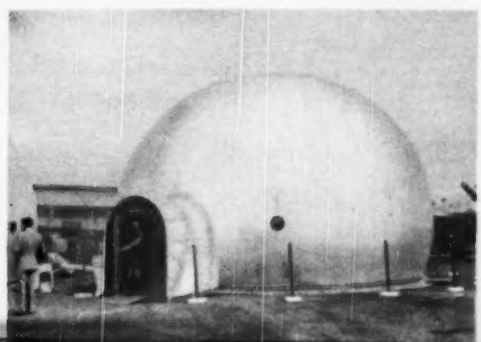
Latest version of the Martin-Baker flat-feed for 20mm cannon.

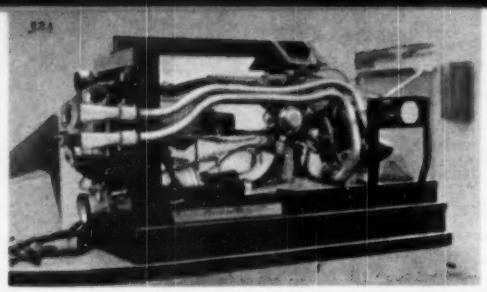


Working model of the Electro-Hydraulics bogie undercarriage, illustrating the trailing action, whereby spin-up drag is halved. (Below) Flight Refuelling equipment being studied : This was not strictly a "static" exhibit for on three of the days the Lincoln and Meteor demonstrated this all-British system in the air.

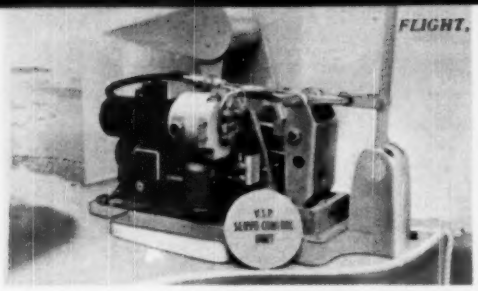


Airborne components of the Ekco cloud and collision warning search radar equipment. (Below) The R.F.D. Portobel trainer is a continuously-inflated rubberized-fabric dome, housing ground-to-air gunnery training equipment. Films of attacking aircraft are projected on to the interior of the dome, and the gunner sits in the centre : sound effects—even to the fall of bombs—are laid on.



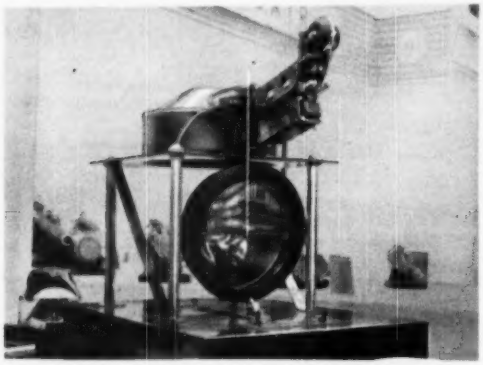


The R.A.E.-Fairey "hot" rocket motor has reaction chambers that are independently adjustable for thrust direction.



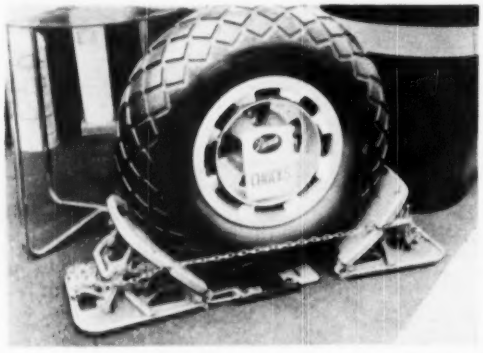
Servo control demonstration unit (R.A.E. and M.L. Aviation, Ltd.)

STATIC SHOW IN PICTURES...



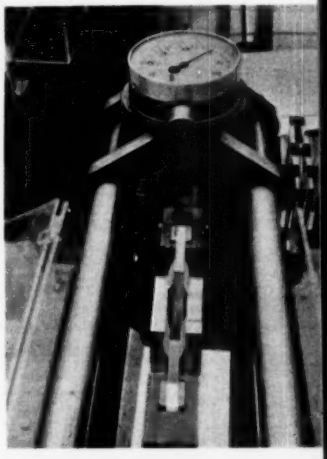
This Harley landing lamp, designed for high-speed aircraft, has a slipping clutch to permit the lamp to "blow shut."

Outdoor static exhibit: Brabazon main and nose undercarriage gear by Dowty, with Dunlop wheels.

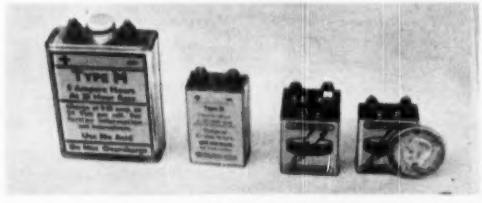


A new line in collapsible chocks, devised by the Pyrene Company, offers unusual advantages in clearing and anchoring.

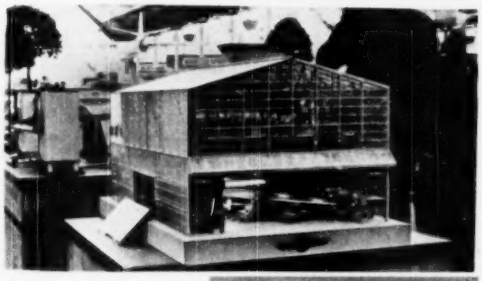
(Right) In this demonstration of the shear-strength properties of rubber-to-Perspex bonding, developed by the Triplex Safety Glass Co., the specimen is shown to be withstanding a tensile load of 1251b/sq. in.

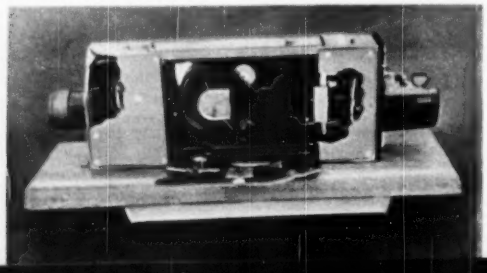


(Below) A 1:96 scale model of the new "Hercules" strength-testframe which, designed at the R.A.E., is to be erected at the new National Aeronautical Establishment at Bedford.

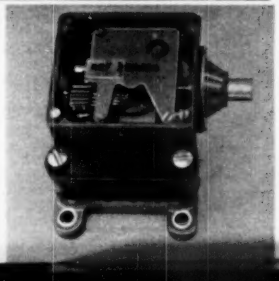


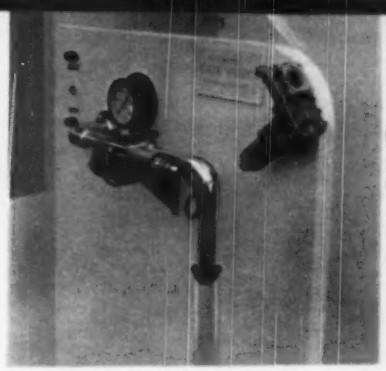
Examples of smaller sizes of Venner lightweight accumulators. (Below) G45 cine-gun camera (part-sectioned) by Williamson.



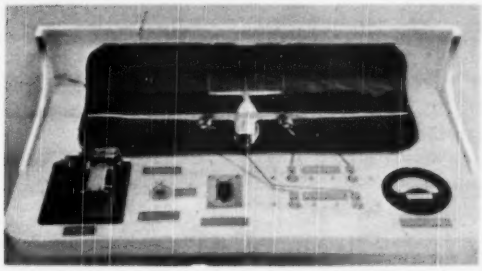


Time-delay switch developed by Venners for use with aircraft fire-protection systems.

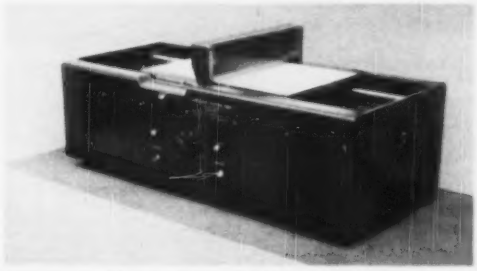




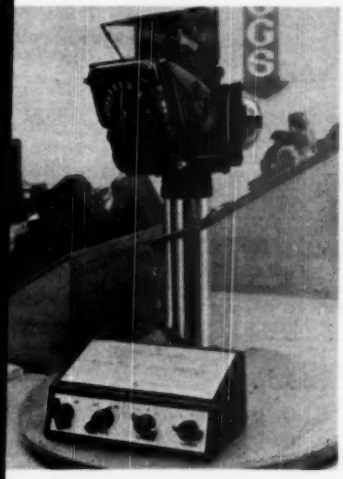
(Left) Goodyear tyres and disc brakes, and an illustration of the cross-wind landing gear. (Centre) Typical of the neatly arranged stands housed in the huge static exhibition marquee were these of the Plessey and Plessey International companies. (Right) This display shows the new motorized gate-valve developed by Teddington Controls.

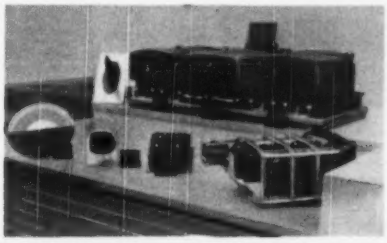


Cyclic de-icing switch gear developed by Teddington Controls.

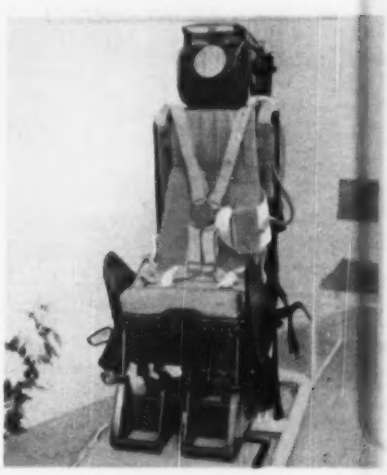


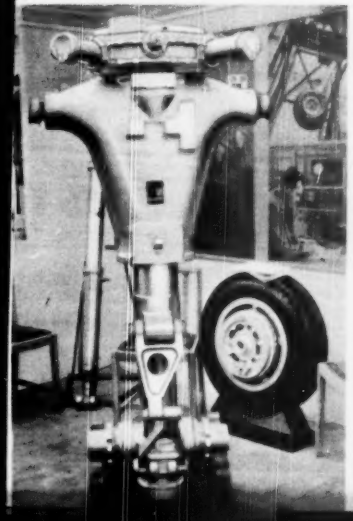
Automatic 50-plot strain-gauge table (Savage and Parsons)

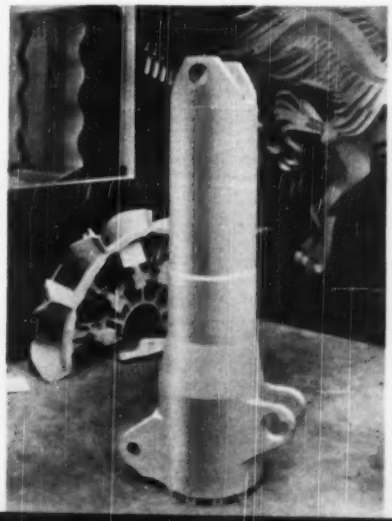


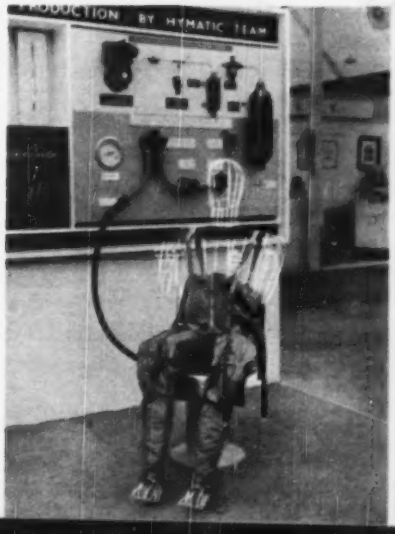


(Left) Working display model of the Mk.4E gyro gunsight manufactured by Ferranti. (Above) Components of the Ferranti airborne distance-measuring equipment. (Right) Latest back-type parachute developed by the G.Q. Company for use with the Martin-Baker ejector seat. (Below, left) British Messier nosewheel strut for new, unannounced British aircraft. In the background can be seen one of the company's disc-braked wheels fitted with a new type Firestone tyre inflated at 150 lb/sq. in. (Below, centre) Main undercarriage outer cylinder forging for the Brabazon, by High Duty Alloys, Ltd. (Below, right) Demonstration set-up of the Hymatic anti-g pneumatic system.







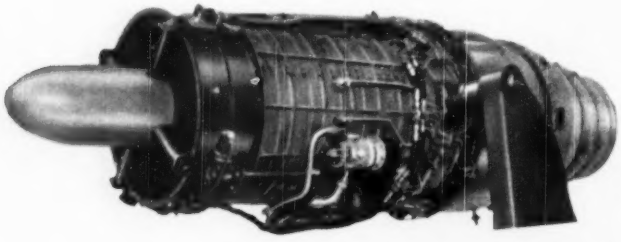


TURBOJETS OF THE YEAR

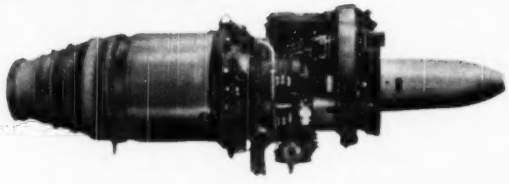
ONE of the most encouraging features of this year's exhibition at Farnborough was the country's continued strong position, immediately apparent, in the gas turbine field. In particular, for the first time there were displayed no fewer than three large axial-flow units from Britain and Canada each capable of delivering over 6,000 lb thrust. These were the Avon, Orenda and Sapphire. Information regarding the latest mark of Avon is almost entirely restricted, and examples were only to be seen closely cowled in aircraft participating in the flying programme. In addition, a version of the well-proved de Havilland Ghost equipped with reheat and a rectangular jet outlet, controllable in area, also achieves a thrust figure of the same order.

Recently announced, and the most powerful of all for which figures have been released, is the Armstrong Siddeley Sapphire, originally of Metrovick conception. This unit, with axial-flow compressor and annular combustion chamber, has passed its type test at a sea-level static thrust rating of 7,200 lb for a specific fuel consumption of 0.907 lb/hr/lb thrust. Its dimensions are: diameter, 35.25in; length, 133.85in; and frontal area, 6.8 sq ft. The Sapphire is illustrated on this page together with the smallest turbojet produced by the same manufacturer. This, the Adder, is a simple jet version of the Mamba turboprop and weighs only 550 lb, though its thrust rating is as high as 1,098 lb. It has a ten-stage axial-flow compressor and a single-stage turbine, and the overall length is 73.3in.

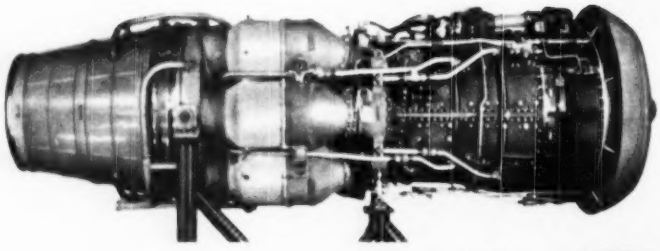
From Malton, near Toronto, Canada, travelled the Avro Canada Orenda. Although photographs and preliminary details have previously been published in *Flight*, this advanced and powerful unit was at Farnborough making its first appearance in England. A year ago the Orenda completed American and British endurance and type tests.



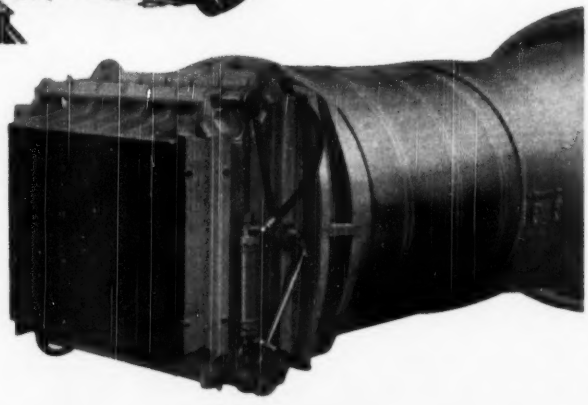
Armstrong Siddeley Sapphire.



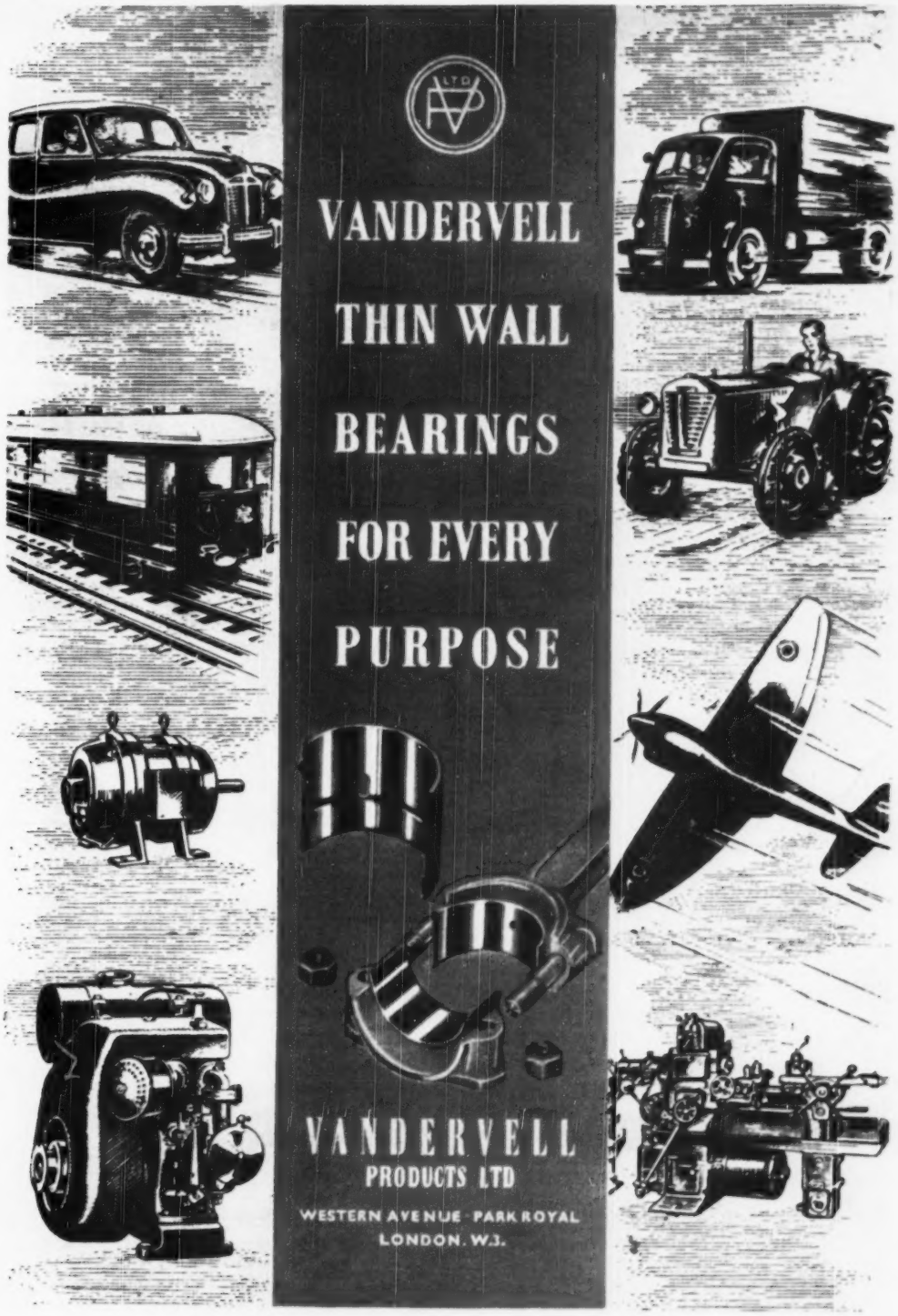
Armstrong Siddeley Adder.



Avro Canada Orenda.



Variable-area nozzle of Reheat D.H. Ghost.


VANDERVELL
THIN WALL
BEARINGS
FOR EVERY
PURPOSE
VANDERVELL
PRODUCTS LTD
WESTERN AVENUE · PARK ROYAL
LONDON, W.3.

EXPERIENCED TRAVELLERS FLY BRITISH

It is significant that most people in this country who travel by air prefer to fly British. A natural pride in a British concern is of course one reason. But airways cannot depend on patriotism alone. The more definite reasons that have impressed themselves on experienced travellers are the comprehensive schedules on routes all over the world, the all-round efficiency, the courtesy, the thoroughness — and, perhaps above all, that sense of complete confidence that is felt by everyone in the presence of British Airmanship.

BRITISH OVERSEAS AIRWAYS CORPORATION AND BRITISH EUROPEAN AIRWAYS

offer services to and from nearly 70 countries

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Seating and Safety

WITH reference to the letter "Seating and Safety" published in *Flight* of July 20th, perhaps Mr. J. R. Sturge-Whiting has not heard of the Vickers Valetta transport aircraft. This 'plane, which is quickly converted to a passenger *rôle*, has 17 double-type seats all facing aft. These seats, which are of tubular construction, are attached by means of hook and claw fittings to lashing points built in the intercostal longitudinal members of the cabin floor and will withstand 25g in a forward direction. They would thus withstand a collective force equal to approximately 83.48 tons. R. G. S.

Egypt.

"Planned Servicing"

AS a sworn enemy of what is euphemistically called "bumph" I crave the hospitality of your columns to call for someone endowed with more inductive reasoning powers than myself to examine the R.A.F. scheme called "planned servicing."

I myself am incapable of digesting this array of retrospective charts and graphs of what happened the week before. When I read the script and come across such terms as "backers-up," "pupil population," "arisings," "weather cycle" and so on I get an intuitive feeling that I am being led up the garden path. One portion of the publication deals with "the underlying causes for the actual aircraft state departing from the planned state."

The first cause of departure reads "Bad weather resulting in flying getting behind schedule," the second, "High rate of unit repairs," and the third, "Excessive number of aircraft awaiting spares." The "general remedial action" (or, in English, what to do in these cases) is a blinding glimpse of the obvious. For the first you are told to resume flying as soon as the rain stops and for the next two contingencies you draw aircraft out of the reserve "pool," where, presumably they must have got wet.

The next snag listed is "High rate of petty unserviceability due to a variety of causes," etc. These causes the writer has left unspecified because he obviously does not know. There is only one cause of petty unserviceability and that is bad maintenance. And finally we are told that if major inspections flow in irregularly we should construct a stagger chart and also if our minor inspections are becoming more frequent we must cut the flying down.

Here we have six reasons for flying getting behind schedule. Five of them are perfectly obvious and have been known by ground engineers and bus companies for years. The other, petty unserviceability, for which the planned servicing people have neither a reason nor a remedy, is caused almost entirely by slack maintenance personnel. And then, superimposed on the foregoing piece of fatuity are dozens of charts which can only show what happened in the past. We all know what happened last week and every week before; we didn't get as much flying in as we wanted. There is no need to make a graph about it, but to seek means of getting more flying in the future.

A given aircraft has an inspection cycle of 50 hours. If it can be got to fly for 50 hours continuously between inspections till it reaches a major the pilots and engineers know exactly what can be achieved with a number of those aircraft, and a continuous flying programme would result, hampered only by the weather. The idea of graphs and charts simply would not occur to anybody because each aircraft is giving of its maximum and it cannot give more. Now this is what we should like aircraft to do and all problems would be solved if it were achieved.

The answer, then, to obtaining maximum flying for minimum servicing is not drawing charts but strict and minute inspection and thorough workmanship. A new aircraft will fly for its full 50 hours because it was inspected by a highly competent body of inspectors at the works. If this were also done each fifty hours and all snags, repairs and renewals carried out, the aircraft would not degenerate into the state that pilots bewail. The engineer officer should spend his time going over his aircraft with a torch and mirror and see that his N.C.O.s do the same and he will soon find an improvement. It is the aircraft that do the flying, not charts and graphs. An aircraft whose integral parts are in first-class condition because it has been gone over with a fine-tooth comb at regular intervals will only suffer from defects caused by bad airmanship.

There is nothing new in this; it has just been lost sight of, that's all. The war inevitably caused a reduction in the standard of maintenance and it would appear that the planned servicing scheme is an attempt to improve it again; but I would humbly suggest that an increase in "bumph" will be no help.

Jallahalli, LESLIE W. CRAWFORD.

Bangalore.

More All-metal Pioneering

I SHOULD like to thank Mr. H. O. Short for his extremely interesting and informative letter published on your Correspondence page in the August 3rd issue of *Flight*. As an ex-member of Short Brothers' seaplane works staff at Rochester, I can assure him I am fully aware of the many outstanding achievements in pioneering aircraft design that he refers to in his letter.

So far as credit is concerned for the pioneering claims of the Silver Streak in 1920 and the little Cockle flying-boat in 1923, I am quite sure responsible opinion in the U.S.A. (and throughout the world, for that matter) acknowledges the genius of the three Short brothers in all they have done in the past in the field of all-metal stressed-skin construction. Only a few months ago, the *Air Trails* American magazine devoted two whole pages of first-class drawings (by a Mr. Douglas Rolfe) illustrating the many outstanding types of flying-boats, seaplanes, and other aircraft built by Shorts from 1909 right up to the Solent design in 1946-7.

As regards the earliest building of stressed-skin all-metal aircraft in the U.S.A., it is worth recalling that Mr. Glenn L. Martin can rightfully claim a "first," since in 1922 he produced a single-engined monoplane known as the MO-1 Series for the U.S. Navy: it was designed for shipboard observation, and was quite successfully employed on these duties. In the 1928-1932 period, Mr. Igor Sikorsky produced his famous S-38 amphibians and S-40 flying-boats for Pan-American, whilst Major Reuben H. Fleet's Consolidated Company built the P.V. Admiral flying-boats for the U.S. Navy, and its civil counterpart, the Commodore—that was in 1928 and 1929 respectively. All these marine aircraft incorporated stressed-skin all-metal hulls, and all were monoplanes.

There is just a point on which I should like to challenge Mr. Short. He makes no reference to the very early achievements of famous French aircraft builders. As early as 1907—some 13 years before the appearance of the Silver Streak—Robert Esnault-Peltrie built a single-seat monoplane with all-metal airframe, although, of course, it did not embody the principle of stressed-skin construction! None the less, it was equipped with cantilever internally braced wings, a radial-type air-cooled engine, the stick-control system, and tandem-wheel undercarriage! In 1911, another Frenchman, the famous Louis Breguet, built and flew an all-metal single-seat biplane which at that time possessed more advanced features than any type of aircraft produced during the next few years. Amongst these were an oleo-leg undercarriage (tricycle type), a horizontally mounted radial motor of 100 h.p. complete with geared airscrew, a single wheel to operate all controls, articulated tail assembly, and monospar wings (warp control). And all that was some 40 years ago!

With these achievements by France's great pioneers, coupled with those later in Germany by the great Prof. Hugo Junkers, it would seem to the undersigned (who has always regarded himself as a thoroughly unbiased student of international aviation affairs) that no particular aircraft designer/builder of *any one nationality* can regard himself as having contributed more than a just share of pioneering in the field of aircraft designing. DENNIS M. POWELL.

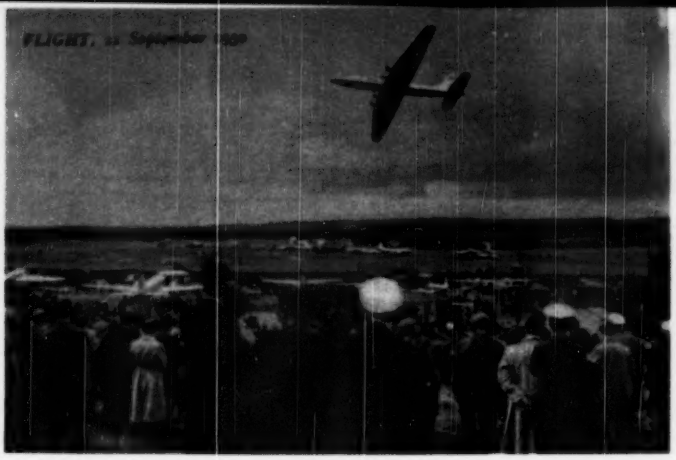
Prestwick, Ayrshire.

Cloud-boring

YOUR correspondent "Reservist," in the issue of August 10th, asks if any others have seen a hole "bored" through a cloud. Yes, I have—when on observer duties during the war I have two or three times seen thin layers of alto-stratus and alto-cumulus literally cut in two by piston-engined aircraft. One particular instance coming to mind was by a Westland Welkin which did a lot of test flying in this district.

Dursley, Glos. H. E. NORMAN.

The general scene, with the Apollo getting away in fine style.

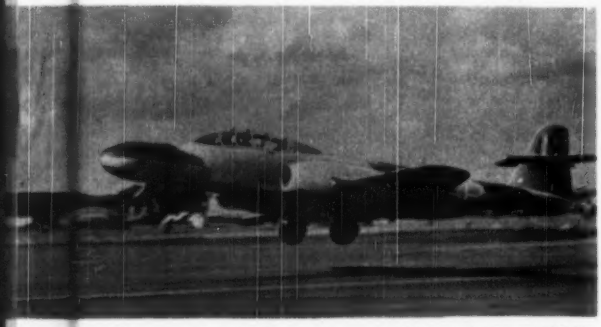


The "Brab": Mr. Pegg presents his mighty mount for the edification and reassurance of the assembled taxpayers—chilled, but impressed.

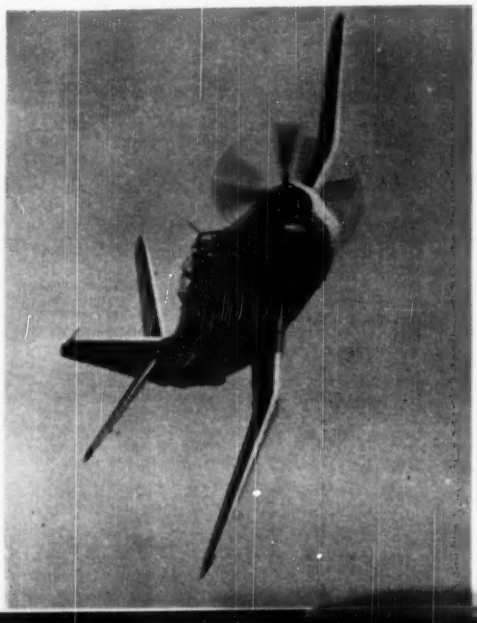
POST-FARNBOROUGH IMPRESSIONS

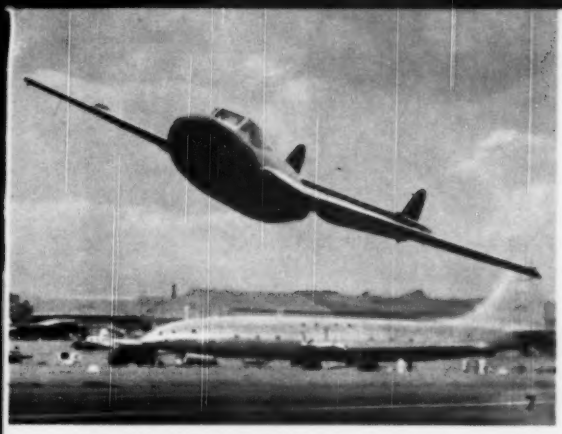
Some Flying-display Highlights

(Illustrated Mainly with "Flight" Photographs)



Above: Sleek and fast—the Armstrong Whitworth Meteor N.F.11 night fighter. Centre right: Up and over—a telephoto shot of "Wimpy" Wade entering a loop on the trim Hawker P.1081 fighter. Below: "Mike" Kilburn passes by on the bombed-up Gloster Meteor 8. Bottom right: A spirited impression of the Blackburn and General Aircraft Y.B.I. piloted by P. G. Lawrence.





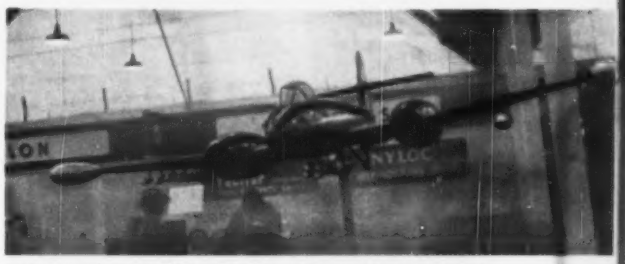
The Brabazon's tail is obscured by efflux-haze from the Ghost in the de Havilland Venom Night Fighter (John Derry)

A high-speed pass by the Supermarine 535 (pilot, Lithgow)

A STATELY salute by the Brabazon, as it set course for Filton, was a fitting conclusion to the 11th S.B.A.C. Display and Exhibition—once again a resounding success. Although the weather was unpleasant on three of the six display days, the flying programme was repeated on each occasion with scarcely a hitch. On the four trade days—September 5th-8th—attendance was estimated at 18,000, a figure well above expectations. The public arrived in force on the Saturday and Sunday, and assessments of the combined crowds varied between 150,000 and 200,000. Three hours after Sunday's performance was over, cars were streaming from the airfield gates at the rate of 2,500 an hour.

The weather on the Friday provided an unwelcome opportunity for proving the pilots' ability to demonstrate their aircraft with "Met" doing its worst. Needless to say, the challenge was met, by men and machines alike, in a manner which warmed all hearts in chilling circumstances. Special tribute must be paid to Wade, Lithgow and Zurakowski for their efforts on that day. Their aircraft—the P.1081, Supermarine 535 and Sapphire-Meteor respectively—were demonstrated at high speed under an exceptionally low cloud base in torrential rain. Dense sheets of vapour flashed and shimmied along their wings, doubtless giving rise, if the truth were known, to a good deal of concern for the safety of these precious prototypes and the stalwarts at their controls.

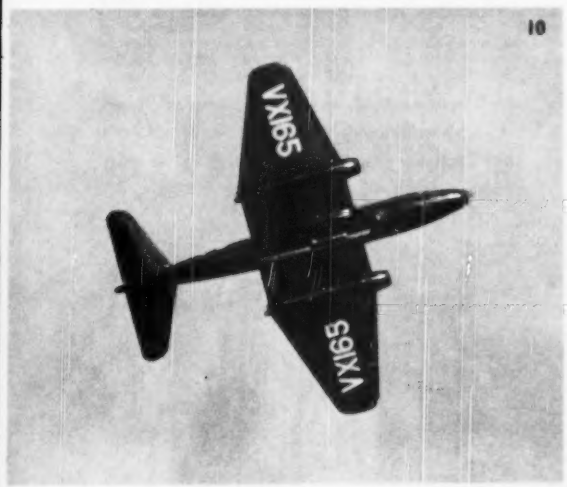
Except for a few minor alterations, each day's programme was identical. The Blackburn Y.A.5, although scheduled to appear, remained at Brough for urgent test-flying. For the last three performances the Canberra B.2 was replaced by a B.1; Flight Refuelling was demonstrated for the first three days only.



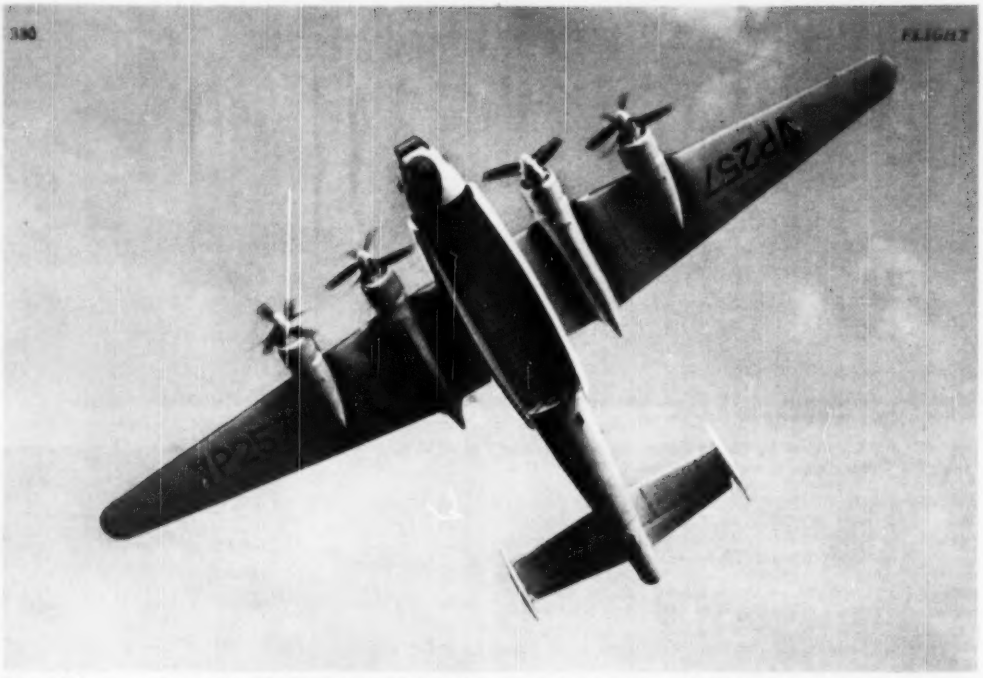
Long-span wings are shown on this model ground-attack Meteor

By way of rounding off our report of the display in the preceding issue, we append some random observations on the men and machines. The most memorable performances were, in our own estimation, those of Heyworth in the Avon-Meteor, Kilburn in the bombed-up, belly-tanked Mark 8 Meteor, Porteous in the Auster Aiglet, and Hazelden and Bloomfield in the Hermes V. This is not to suggest that the "regulars"—Wade, Lithgow, Duke, Zurakowski and the rest—were in any way inferior in their standard of flying; but their *repertoires* were relatively familiar. A special word must be said of "Zura's" performance. Some disappointment was expressed that this did not exemplify the available thrust of the Sapphires in the manner of Heyworth—that is, by sustained near-vertical climbs from take-off or slow-speed level flight. Evidently the Gloster pilot was determined not to vie with the Rolls-Royce

A peep into the future—the Canberra shows its bomb-bay



The trim-looking, Leonides-powered Handley Page H.P.R.2



Johnny Baker shows that the Avro Shackleton is a machine of character—and capacity. (*Below*) the Avro Ashton

POST-FARNBOROUGH IMPRESSIONS

veteran in this regard, but to adhere to his planned sequence of manoeuvres. Of these, the most spectacular was a series of three loops from take-off which won acclaim from experienced Meteor pilots.

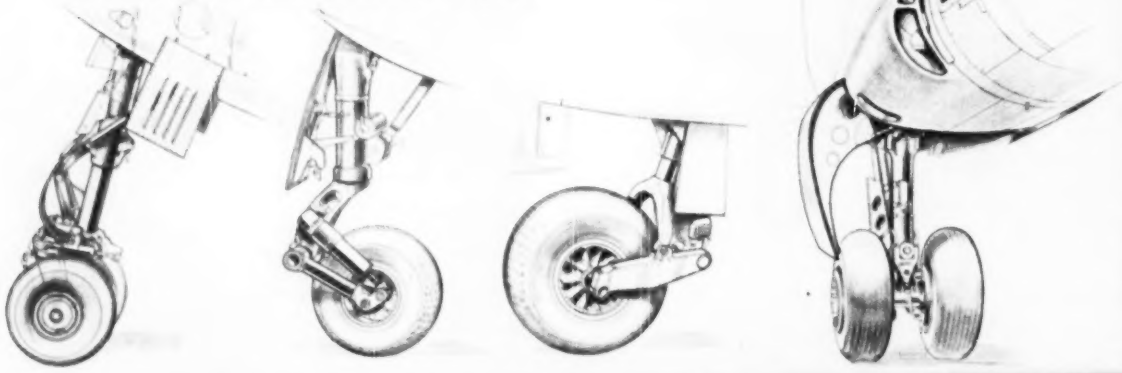
A tour of the parked aircraft was, as always, highly rewarding to technical observers. It was noted, for example, that the Varsity has sprouted wing "fences" in the style of the Comet and Venom, and that the admirable, asymmetric "petal" cowlings of this type were reproduced in the Viscount 700. The Viscount, incidentally, flew on one occasion with only one of its four Darts operative, and the undercarriage was lowered before these units were restarted. There was some comment that on one or two occasions the landing speed of the Viscount seemed rather faster than usual, though there was little fear that this airliner will achieve notoriety for "hot" landing characteristics. The Mambas of the Armstrong Whitworth Apollo were fitted with de Havilland airscrews—four-bladers inboard, three-bladers outboard—whereas those on the Short S.B.3 had

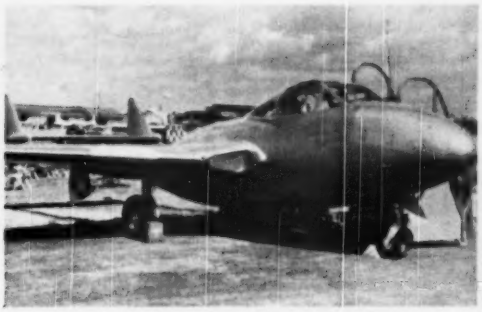
four-blade Rotols. The thrust of the Mambas in the Short is obviously not augmented by residual jet-reaction, for the jet pipes were seen to be turned through a right angle and to eject downwards. Both the Fairey and Blackburn anti-submarine aircraft rolled with only one Mamba in action.

(*Below, left*) Nosewheel assembly of the Fairey 17 (to be compared with adjacent Blackburn sketches)

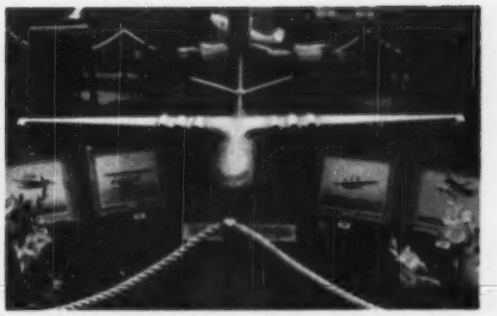
(*Below, centre*) Nosewheel and mainwheel assemblies of the Blackburn Y.B.1 anti-submarine aircraft

(*Below, right*) Viscount 700 inboard nacelle, showing intake to de-icing heat-exchanger and flush intake to cabin-pressure blowers. The oleo leg is offset from the centre-line to clear the jet-pipe

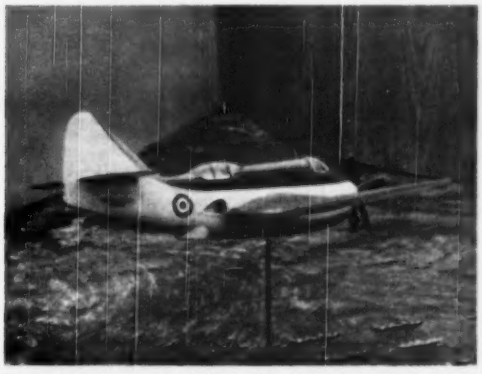




Latest of the Vampire line—the new two-seater Trainer



A beautiful lady—the projected Saro Duchess, shown in model form



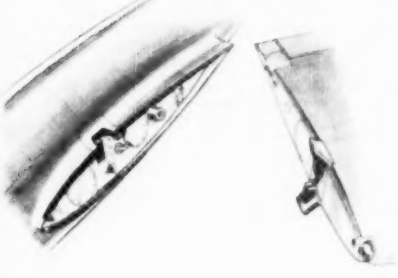
New cockpit location on the Fairey 17, shown on a model

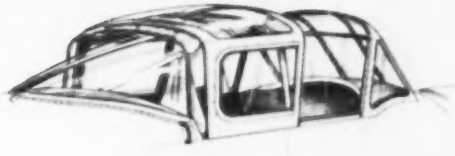
An extraordinarily educational view, including the Brabazon, a Lincoln, the Westland and Bristol helicopters, Blackburn Y.B.1, Viscount, Ashton, Short S.B.3, Ambassador, Canberra, Tay-Viscount, Varsity and G.A.L.60 (N.B. Span of the Brabazon is 230 feet)

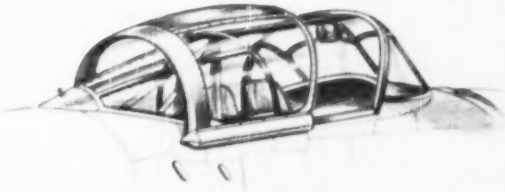
(*Below*) Attachment of tip-tanks on the Venom Night Fighter

(*Below, right*) Cockpit enclosure of the Handley Page H.P.R.2

(*Upper right*) Cockpit enclosure of the Percival P.56 Trainer







Military pack-mule: Specially designed for airborne logistics, the Fairchild XC-120 Pack-plane features a detachable cargo pod which can be quickly demounted and rolled away on its own undercarriage. The aircraft "sans pack" then flies away for another preloaded pack unit. Noteworthy is the quadricycle landing gear of the main aircraft.

CARGO-CARRIER CONCEPT

Design-logic for Airborne Logistics: The Fairchild XC-120 Pack-plane

By STANLEY H. EVANS, F.R.Ae.S., A.F.I.Ae.S.

TO the Greek logicians may be attributed the common alliance of logic and logistics, for while logic might be defined as the intuitive art of reasoning, logistics was its spouse from which sprang the science of reckoning, estimating and present-day figure-juggling. And now that the Western Alliance has apparently adopted the Greeks *en masse*, it seems altogether fitting that we should adopt their logic and adapt their logistics to the demands of the twentieth-century air age. Logistics in the military sense of planning and supplying the personnel and material of war is now a favourite word in the military lexicon; and the subject of our current review—the Fairchild XC-120 Pack-plane—is an interesting study in showing how the aircraft designer is logically meeting this demand.

Conceived with Gallic logic by Armand J. Thieblot, French-born chief engineer of Fairchild's Aircraft Division, and developed under a U.S.A.F. experimental contract, the Fairchild XC-120 Pack-plane is a military transport prototype patterned after the trailer-truck principle, in which the aerial truck or basic flight structure can be flown with or without its cargo pack, or lower fuselage container. Publicized as the first aircraft to be built with a detachable fuselage, the XC-120 is believed by the Fairchild designers to pioneer an entirely new cargo-carrier concept for meeting some of the urgent problems of military logistics—of which, perhaps, the most pressing is the time required to load and unload cargo, particularly in forward staging areas under combat conditions.

Pack Drill

Completed in June, the prototype has since been undergoing intensive inspections and ground tests to try out and bed down its unorthodox quadricycle landing gear. (Initial troubles have been reported.) On August 11th, flying with its pack *in situ*, the XC-120 was aloft for some 45 minutes and is reported to have handled in the air much like its family forebear, the C-119 Packet transport, which, in its twin-boom airframe layout, it resembles to a large extent. After some more flights with the cargo-container attached, and some additional ground taxi tests, the XC-120 will be flown minus its huge pod—under which conditions the wind-tunnel tests indicate that no unusual flight characteristics should arise. (This deduction seems logical enough—on the principle that the foot-soldier is always a lot happier when he gets the pack off his back!)

The design concept back of the Pack-plane—to quote Thieblot—is that the prime mover, containing wings, control surfaces, power-plant, tankage and flight bridge, is the major investment in the aircraft. The cargo-container, on the other hand, is a relatively minor item, which can be tailor-made to carry a fixed installation such as a command post, radar station, repair shop, or field hospital—all ready for operation immediately after landing. It can, in effect, be a pre-packed supply depot, where all the needs of a military unit for a fixed period are loaded in correct order at a base depot, flown to the air-head and towed from there, on its own wheels, to the dispersal area or the point of ultimate use. Actually, says Thieblot, the XC-120 is the guinea-pig for a theory in transportation, new in aviation but a very old one in every other kind of haulage; for example, the idea of separating the payload from the prime mover made the road haulage business the versatile enterprise that it is to-day.

In military use, the chief advantage of this airborne pack-mule idea is that it eliminates the long, expensive (and vulnerable) periods on the ground while cargo is being handled, as is necessary with current transport designs—especially so in the case of conventional-fuselage types with side-door loading. A Pack-plane can fly into a field, have its cargo pod quickly detached and towed away on its own individual carriage, and be ready to take off to pick up another fuselage pack, all within a matter of minutes. (In recent U.S. joint Army-Air Force exercises, the unload times at the air-head became a critical factor, ranging from 45 minutes for the Douglas side-door C-74 to about 15-20 minutes for the Fairchild end-door C-82 and C-119 Packets).

Moreover, apart from providing greater utility of the prime mover, this reduced time on the ground limits the

potential damage, in case of enemy attack, to the relatively inexpensive cargo-container. Once it is on the ground and detached from the aircraft, the XC-120's fuselage container can be unloaded at the most convenient time for the ground crews, then reloaded and stored away until it is ready to be picked up by another Pack-plane. To facilitate rapid handling of the cargo, the detachable portion has both front and rear clam-shell doors located very close to the ground.

In practice, the pre-loaded pack, mounted on its own undercarriage (comprising four dual-wheeled assemblies), will be towed in place between the twin booms of the flight structure and mated against the four ball-and-socket connections of the upper deck. The cargo pack is then raised by means of four electrical cable hoists, the space between the two structures being sealed off with rubber tubing which is pumped up with air to form an airtight connection. After removal and stowage of the wheels of the pack undercarriage, the combination is ready to take off—all of which said pack-drill takes only a few minutes. Upon reaching its destination, the pack is easily detached and towed away, while another pre-loaded container is rolled into position and hooked up.

Design Highlights

By specifying a portable pack unit that had to be towed off forwards, the military planners clearly gave the designers of the XC-120 a difficult landing-gear problem to solve; indeed, the configuration and structural design of the landing gear—more particularly the auxiliary nose gear—must have provoked considerable cerebration since, obviously, the orthodox tricycle gear was out of the question and resort had to be made to a somewhat awkward-looking quadricycle layout. The structural awkwardness stems, of course, from the fact that the nose outriggers must be located well forward under the engine cowls, in order to provide a reasonable wheelbase for stable ground and braking characteristics, and also to accommodate large changes in the c.g. between the pod-on and pod-off conditions. Having satisfied these ground-handling conditions, the long cantilevered nose-gear structure must then be jack-knifed and retracted into the same nacelle opening as the main gear.

While this complex quadricycle solution is bound to come out a bit heavy on the weight budget and, in the early stages of development, the operational maintenance of the gear has not been free from trouble, these debits must fairly be charged against the peculiarly difficult design *desiderata* of a military cargo-carrier—as interpreted by the U.S. Air Force. When a military specification lays down the transportation of telegraph poles with both ends protruding from the open pod, orthodox design thinking must perforce be jettisoned along with the pod doors!

Superficially, the rest of the XC-120 flight structure looks like a C-119 with the cargo-hold sliced off, except that the vertical tail of the XC-120 follows the divided pattern of the earlier C-82. The C-82, begun in 1943, was the original design of Fairchild Packet, intended to support the invasion of Japan by hauling in paratroops, combat cargo and supplies, and evacuation of the wounded—or, logistically figuring, to haul a load of 12,000 lb over 2,000 miles. It had to operate from unprepared bases and be capable of rapidly loading and unloading heavy cargo, either into vehicles or on to the ground, without the aid of auxiliary loading equipment. Operation from rough terrain set the fashion for the high wing; tailboard loading requirements produced the rear-opening, low-to-the-ground nacelle; and the demand for optimum cargo utilization called for a fat box-car type of cargo-hold. All these features are worth recalling because they have influenced the Fairchild family strain right from the start.

The C-82 was, in fact, the first American production aircraft conceived *ab initio* as a combat cargo-carrier, and these intrinsic features were followed through in the C-119, a later version with more power and payload. In response to the requirements of mass paradropping and the need for improved angles of vision ahead and below for the flight crew, the front end was redesigned by shifting the cockpit from the top of the fuselage to the nose. The cargo hold was also widened and increased in volume from about 2,300 to 2,700 cu ft, while the gross weight was pushed up from 54,000 to 74,000 lb, and the overall dimensions scaled up to match. For the carriage of combat cargo loads up to front-line air-heads, within running distance almost of the battle-line, the C-119 Packet has thoroughly proven in recent military manœuvres the inbred logic of its design conception.

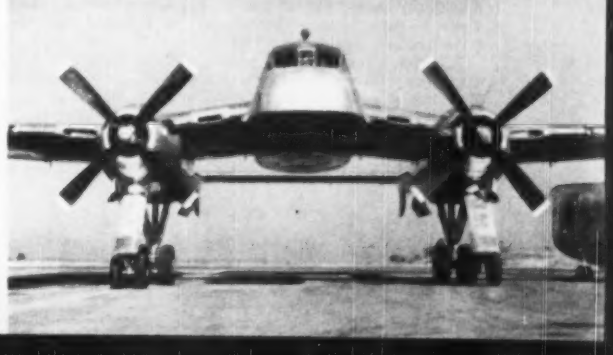
The pack unit is here shown being towed away from the basic flight structure of the XC-120. Upper and lower decks of the fuselage are connected by four ball-and-socket joints, with four electrical cable hoists to raise and lower the pack fuselage.

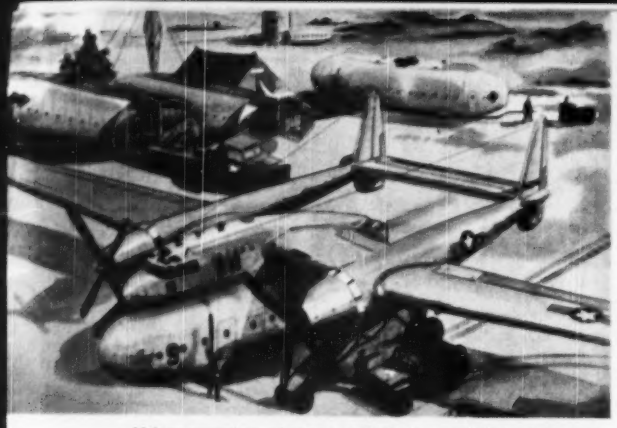
Nevertheless, the military cargo operators have long been intrigued with the flexibility offered by an aerial version of the trailer-truck combination, and in the Pack-plane we see the birth of the guinea-pig to test this principle in full-scale practice. However—as the designer himself is careful to point out—the XC-120 was not designed as the complete answer to a rigorous specification. Rather, it was built as a test vehicle through which certain key logistics questions could be posed and answered *ad litem*, so to speak. This is because the military air transport planners are now in the process of resolving certain of the basic dimensions and techniques for future air transportability, and hence the XC-120 will function as the breeding instrument. In other words, the railroad box-car that inspired the first two Fairchildren is not necessarily the standard of the future, since a truly airborne army is likely to establish its own basic dimensions, regardless of the limitations imposed by rail transit.

Performance Logistics

Broadly speaking, the XC-120 may be expected to have much the same operating and handling characteristics as the C-119, for both types have similar power-plants and aerodynamic configurations. Thus, in both designs the wing

Top deck only: The XC-120 minus its pod. Wind-tunnel tests suggest that it will behave quite happily in the air under these conditions





Making several round trips, one Pack-plane could bring into an airhead in a combat zone several packs filled with troops and supplies, leaving the pack units to be used as field hospitals, storage shelters, command posts, radar stations, repair shops, etc. Ambulance pods, carrying wounded, could be attached for the return trip.

CARGO-CARRIER CONCEPT . . .

area and span are the same, while the power-plant comprises two Pratt and Whitney R-4360-20 Wasp Majors turning 15ft Hamilton Standard paddle-shaped four-bladed airscrews. This particular Wasp Major series develops a maximum of 3,250 b.h.p. for take-off (dry) and has a normal output of 2,650 b.h.p. at 6,000ft and 2,300 b.h.p. at 16,300ft.

Overall dimensions of the XC-120 are: wing span, 109ft 3in; length, 82ft 10in; and height, 25ft 1in. With a wing area of 1,447 sq ft, the geometric aspect ratio works out at 8.25, but the effective aspect ratio must be considerably lower by reason of the discontinuities caused by the triple effect of the central nacelle and twin tail-booms on the spanwise load distribution. The detachable cargo pack has a capacity of 2,700 cu ft and can carry up to 20,000 lb of cargo or military payload. When used as a medical unit, the pack can accommodate 36 litter patients and three attendants.

Bearing in mind the 74,000 lb gross weight now officially quoted for the C-119, the publicized gross weight of "about 64,000 lb" for the XC-120 (with similar power-plant and airframe structure, but heavier landing gear and pod) need not be taken too literally. Reminiscent of the "hare-and-hounds" paper-chase of one's youth, in which the false scent was considered fair gamesmanship (at any rate for the hare !), this sort of thing lends excitement to the sport and is excellent training for the nose as well as the eye. The false scent along the military trail is, of course, the artful art of ambiguity which masks the term "gross weight," since the "normal (or design) gross weight" is seldom the finalized "maximum take-off weight" (or "military overload weight") at which the military services will try to break the camel's back.

And so it is generally a sound rough-and-ready rule to add at least 20 per cent to the publicized gross weights of most military aircraft in the prototype stage, though in the classic example of the Boeing B-47 the latest gross weight has now reached the astonishingly high value of nearly 50 per cent above the original design figure. (S.P.C.A. please note !) However, adopting the more conservative basis of plus 20 per cent, the overload gross weight of the XC-120 at take-off is quite likely to finish up in the region of 77,000 lb. As a matter of fact, Fairchild are known to be interested in eventually turbopropping the XC-120 with a pair of Allison T-40s at this figure—which seems to indicate that the structure has been stressed that high.

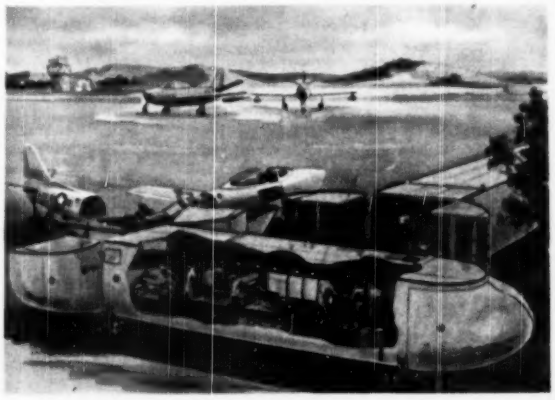
Anyway, according to our reading of the signs, the XC-120, operating with a crew of five at a take-off gross weight of 77,000 lb, should be capable of hauling the maximum capacity cargo load of 20,000 lb plus its full tankage of approximately 2,800 U.S. gallons—granted, of course, that first-class airfields with 6,000-ft runways are available. (At this weight, the wing and power loadings are 53.2 lb/sq ft and 11.8 lb/h.p., which means that the take-off to clear the standard 50-ft hurdle would be somewhere within the 5,000-5,500ft length, or roughly one mile.) Under these operational conditions, then, our range-finder indicates a maximum (still-air) range of 2,260 miles, which, allowing for the drag penalty of the pack, checks out reasonably well with the publicized range of 2,400 miles for the C-119 with full tankage and gross weight of 74,000 lb.

Speed and climb performance of the XC-120 has not been officially released, but a fairly close estimate can be computed by comparison with the C-119 which, at 74,000 lb, is reported to have a top speed of 258 m.p.h. at 18,000ft. If the Wasp Major R-4360-20 model develops 2,300 b.h.p. at that height (including ram-pressure height increment), the minimum parasite drag coefficient comes through the mill with an approximate value of 0.026. Pushing this figure up to 0.028 for the larger pack-type fuselage of the XC-120, and adjusting the span, parasite and thrust-power loading parameters for a gross weight of 77,000 lb, results in a top speed of 245 m.p.h. at 18,000ft. Landing speed at a final landing weight of 60,000 lb, with near-empty tanks, should be around 90 m.p.h. Initial climb off the ground is estimated to fall within 1,000-1,100ft/min and the full-load service ceiling should reach a comfortable 22,000ft.

The elongated canister-type passenger fuselage converted for cargo carrying has lately come in for considerable criticism by the U.S. Military Air Transport Service, and these same logistics experts see in the detachable pack aircraft a highly promising line of development. They believe that the pack technique applied to the right kind of airframe layout is the logical aeronautical extension of the highway trailer and its truck tractor and the split-cargo-load compartment in the railway freight business. To summarize, they see in the Pack-plane principle the following possibilities: (1) reducing the number of aircraft required by the operator; (2) increasing the aircraft utilization two- or three-fold; (3) reducing the ground handling time and cost to the minimum; (4) providing flexibility of operation; and (5) providing storage and transportation space for various types of cargo and supplies.

As an engineering interpretation of a novel (and difficult) specification, the XC-120 has the airmarks of a logical design approach to the specialized cargo transport aircraft, commercial as well as military. The next obvious step, of course, is turbopropping—which could lead to a further logical step along Burnelli wing-fuselage lines, since the turboprop installation with submerged engines and airscrews well forward of the aerofoil leading edge might well solve past difficulties of this once promising type and breathe fresh life (and air) into it. Later still, perhaps, the tail booms with their appendage will disappear down the evolutionary road like the guinea-pig's tail.

This cut-away drawing, showing the pack being used as a repair shop, gives an idea of the spaciousness of its interior.



FARNBOROUGH -WEEK NEWS

World Aviation Affairs in Brief

RECENT communiqués from the Far East report effective strikes against North Korean targets on land and sea by American and British Naval aircraft. Fireflies and Seafires, painted with black-and-white stripes for identification purposes, are so far the only British Naval machines reported in action (although Sea Furies from H.M.S. *Theseus* will probably receive their baptism of fire in the near future). Skyraider strike aircraft, Corsairs and Panther jet fighters are being operated from carriers of Task Force 77 by the U.S. Navy and Marine Corps. Night and day patrols are being flown by R.A.F. Sunderlands and U.S.N. Neptunes and Mariners. Two Sunderland squadrons have now been placed under United Nations command.

◆ ◆ ◆

The Home Fleet's autumn cruise, which began on September 14, is expected to last until December 7 and will include visits to French and Portuguese ports. *Implacable*, the usual flagship of the C.-in-C., Admiral Sir Philip Vian, is under refit, and her place is taken by the battleship *Vanguard*. Rear-Admiral C. E. Lambe, commanding the Third Aircraft Carrier Squadron, is flying his flag in H.M.S. *Vengeance*. Other carriers involved in the Home Fleet's exercises will be *Indefatigable*, of the Training Squadron, and the Canadian light fleet carrier *Magnificent*, which will join the Fleet at Gibraltar.

◆ ◆ ◆

One tactical-reconnaissance and four fighter-bomber groups of the U.S.A.F. Air National Guard are to be recalled to active service. The Air National Guard corresponds to the British R.Aux.A.F. and is equipped mainly with fighters, both jet and piston-engined.

◆ ◆ ◆

Each of the five R.A.F. schools of recruit training has been "adopted" by a flying command, and recruits now visit operational stations early in their R.A.F. career. Transport Command, for example, provides No. 7 S. of R.T. at Bridgnorth with facilities for visits by recruits, and three selected airmen from Bridgnorth were recently taken on a 15-day trip to Singapore. Padgate has been adopted by Fighter Command, and the training flights have been named after 20 fighter-pilots killed in the last war. When possible, recruits who volunteer for service with the patron command of their training-centre are posted to a station in that command.

◆ ◆ ◆

The special meeting of shareholders of Blackburn and General Aircraft, Ltd., on September 7, instead of being the stormy affair originally expected, lasted only ten minutes, with only two brief speeches, one from the chairman, Mr. Robert Blackburn, and the other from Sir Maurice Bonham-Carter. It was made apparent in the speeches that a proxy vote by shareholders had shown unmistakably that they wished to support the existing board under Mr. Robert Blackburn and that any suggestion of voluntary liquidation was now ruled out by the almost certain prospect of rearmament orders. It was stated that agreement had been reached on the differences between the company and Hanworth Securities. Mr. H. V. Gort and Capt. Norman Blackburn, the termination of whose appointments as directors was one of the causes of the storm, would retire from the boards of the Blackburn company and its subsidiaries, and Sir Maurice Bonham-Carter, as chairman of Hanworth Securities, would join the board. Substantial tax-free compensation is to be paid to the two retiring members.

EFFICIENCY IN EXTENSO: This latest version of the well-tried Constellation, designated L-1049, embodies an 18ft increase in length and a 9,000 lb increase in a.u.w. over previous marks

◆ ◆ ◆

The Allied High Commission in Germany is reported to have approved in principle an application from the Western German Government for the chartering of aircraft from foreign companies for "limited official purposes." Numerous contract offers have already been received from national airlines and private operators throughout Europe. It has been ruled, however, that the aircraft are not to be used commercially, and that they must be owned and operated by nationals of the allied countries. A rumour that the German Ministry was already negotiating a contract with S.A.S. has been officially denied.

◆ ◆ ◆

America's most powerful turboprop, illustrated on page 340, is the Pratt and Whitney T-34, of which some preliminary details have been released. Following a 50-hour ground-running test at a rating of 5,700 h.p., the T-34 made its first flight in the nose of a Boeing B-17 test-bed aircraft. The B-17's four 1,200-h.p. Wright piston engines were all feathered during the first and successive test-flights. Stainless steel is used "almost exclusively" in construction of the T-34, which weighs 2,500 lb. Leading features are : 13-stage axial-flow compressor; annular combustion chamber; three-stage turbine and single power-control linking airscrew speed with fuel flow and altitude. The unit has a diameter of 30in and is 185in long. Specific fuel consumption is quoted as 0.62 lb/h.p./hr.

◆ ◆ ◆

Plans for the integration of A.O.A. and P.A.W.A. are now going forward and it is reported that the Atlantic division of the new combined organization (split into five separate regions) will be under the direction of Mr. H. R. Harris, formerly a vice-president of A.O.A. It is thought that no staff dismissals will result from the merger. The effective dates of T.W.A.'s new services to London and Frankfurt and P.A.W.A.'s flights to Paris and Rome were announced in *Flight* of September 7. Meanwhile, the C.A.A.'s decision to approve the merger is the subject of considerable speculation in the United States, where it is thought that the final test of its desirability will rest on whether an overall economy will be achieved in Government financial aid to the two companies. It is pointed out that, whereas in 1946 the three operators concerned together carried 83.3 per cent of all passengers between the United States and Europe, this percentage has gradually declined until, during the first six months of this year, it amounted to only 64.4 per cent. U.S. aviation circles are now wondering whether the new set-up will permit any improvement of this situation. The *New York Journal of Commerce* comments : "One certain effect of the merger will be to place Stratocruiser and Constellation in very direct competition and the results will be interesting to watch."

◆ ◆ ◆

Pilots selected to fly two Boulton Paul Balliol 2s in American comparative trials, which began on September 10 and will last several months, were S./L. F. B. Sowrey, Central Gunnery School, and F./L. G. S. Hulse, D.F.C., Central Flying School. The trials are being held at Randolph Air Force Base, Texas. Other types involved are the Chipmunk, supplied by the R.C.A.F., and the Fairchild T-31, Beechcraft T-34, Temco T-35 and North American T-6 basic trainers, from the U.S.N. and U.S.A.F. The U.S.A.F. will train five students on each type, occupying about

EASY ON THE PILOT: Exceptional ease of handling is claimed for Italian Agusta CP-119, an all-wood personal four-seater, which for several months has been undergoing performance trials

FARNBOROUGH-WEEK NEWS . . .

six months; the U.S.N. will then begin a similar programme at Pensacola. Manufacturers' production contracts will not be awarded as a direct result of the trials, which are intended to evolve an ideal *specification* for a basic pilot-trainer; North Atlantic Treaty Nations will eventually standardize their pilot-training procedures and employ aircraft which, though having similar characteristics, are designed to suit individual local conditions.

• • •

On October 1 Ferodo, Ltd., are to open new service depots at 42, Commercial Road, Southampton (tel. 76577) and 139-143, Lower Parliament Street, Nottingham (tel. 46017/8).

• • •

New R.Aux.A.F. appointments are announced by the Air Ministry. S./L. G. J. Beadsall, who joined No. 504 (County of Nottingham) Squadron as a flying officer in July, 1947, has been appointed its new commanding officer. New C.O. for 608 (North Riding) Squadron is S./L. F. A. Robinson, D.F.C., a regular officer who was commissioned from Cranwell in 1939. Until last May, he was in charge of administration at the School of Land/Air Warfare. W./C. J. F. Sutton, D.S.O., D.F.C., A.F.C., becomes C.O. of No. 3512 (County of Devon-Exeter) Fighter Control Unit. Commissioned in 1936, W./C. Sutton was released from the Service in 1946, after spending much of his operational career in Bomber Command.

• • •

A sudden and unexpected increase has been noticed in the carriage of air freight to and from the Union of South Africa. Freight agents are now said to be entering into fierce competition for aircraft space and a large backlog has been created by the increase in imports from London, Amsterdam and Brussels. The causes of this sudden revival are attributed to various factors such as fear that shortages may result from a spreading of the Korean war, the better business conditions which now exist between the Union and other soft-currency areas, and the success of propaganda campaigns conducted by the airlines. Ironically enough, the boom in freight traffic arrives at a time when post-war freighter aircraft have been taken out of service through lack of cargoes. A substantial rise has also been noticed in passenger traffic during the last few months and many companies have had to provide extra services.

• • •

Recognizing that there is a shortage of facilities for the training of pilots and flight engineers for the M.C.A. technical examination conducted by the A.R.B., the College of Aeronautical and Automobile Engineering has appointed an instructor for the purpose—Mr. W. J. C. Speller, A.F.R.Ae.S., who was for many years with the A.I.D. and the A.R.B. Under the direction of Mr. H. E. Fozard, M.B.E., A.M.I.Mech.E., A.F.R.Ae.S., Mr. Speller conducts five courses covering all types of aircraft on the British register, including helicopters and flying boats. The five are as follows: No. 1, Pilot "B" Technical Rating Issue; No. 2, Pilot Type Endorsement (Single-engine); No. 2a, Pilot Type Endorsement (Multi-engine); No. 3, Flight Engineer Issue; No. 4, Flight Engineer "A" Type Endorsement (Multi-engine). The first two students have already passed the A.R.B. examination. Full details of the course obtainable from the College at Sydney Street, King's Road, London, S.W.3.

NAVAL ACTION: Wearing identification stripes on the wings, a Fairey Firefly I "goes round again" on returning to H.M.S. *Triumph* after an armed reconnaissance over Korea

• • •

In *Information Circular No. 87*, the Ministry of Civil Aviation publishes a summary of the most up-to-date information on phenomena likely to be encountered by aircraft flying in thunderstorms. The circular deals with all aspects of the subject including the effect of turbulence, hailstones, icing, lightning, static electricity and instrument error. It also details procedures to be adopted by pilots when approaching and flying in storms.

• • •

Following a flight in a Tiger Moth at 200-300ft an Edinburgh pilot was recently prosecuted on a charge of dangerous flying. It was alleged that his low flying had "caused alarm" among local residents. The magistrates, however, accepted the pilot's statement that there was practically no danger, because, from the height at which it was flown, the aircraft could have effected a successful forced landing in the event of engine failure.

• • •

As a result of the strike by Canadian railway-workers, airlines serving the west coast of Canada are now experiencing one of the biggest booms in their history. Traffic through British Columbia alone has increased to a point where more than 20,000 passengers and 60 tons of cargo are being flown daily. T.C.A. is making 21 flights a day between Vancouver and Victoria, while aircraft of Queen Charlotte Airlines recently lifted 739 passengers and 33,000 lb of freight in one day from Vancouver.

• • •

The British Air Transport Advisory Council, which advises the Ministry of Civil Aviation on applications made by the charter companies to operate scheduled services as associates of B.E.A., will shortly consider applications for such services in the period commencing 1951. Application forms, which should reach the Council before October 16, may be obtained from the Secretary of the British Air Charter Association at Londonderry House, 19, Park Lane, London, S.W.1.

• • •

W./C. P. G. Wykeham-Barnes, D.S.O., O.B.E., D.F.C., was awarded the American Air Medal on September 10 for meritorious service in Korea. A specialist in intruder operations, W./C. Wykeham-Barnes destroyed 15 enemy aircraft during the war. He flew out to Korea at short notice on August 15 to act as an adviser on night attacks to the U.S.A.F., and made numerous sorties against the North Koreans, flying Douglas B-26 Invader twin-engined light bombers.

• • •

For the financial year ended June 30, Trans Australia Airlines showed a profit of £200,000—the first time in its history that the company has not incurred an operating deficit. The profit is said to be due to the overall economies effected by eliminating luxuries such as free newspapers to passengers in flight and the provision of less costly meals. Moves made during the early part of the year to bring about an amalgamation of T.A.A. with A.N.A. were unsuccessful and no further action in this direction is thought likely.

• • •

For the second year in succession, Mr. F. Dunkerley, chairman of the Lancashire Aero Club, has won the Siddeley Challenge Trophy Race, which took place at Baginton airfield, near Coventry, on September 2. Flying his well-known Gemini 1A, he achieved an average speed of 158 m.p.h., some 4 m.p.h. better than his performance in the King's Cup race with the same aircraft. Second was Mr. D. J. Jemmett (Hawk III) of Wolverhampton Aero Club, with a speed of 125.5 m.p.h., while third place went to Mr. E. Ross (Hawk III) of Redhill Flying Club, with a speed of 126.5 m.p.h.

• • •

The 100 Mustangs recently ordered from the United States by Canada will be used to form one additional regular squadron and to increase the strength of existing auxiliary units. Purchase was arranged under the terms of the U.S. Mutual Defence Assistance Pact and delivery is expected to take a few months. Further Canadian news is that "one of the largest single military orders in Canada's history" will increase greatly the original order for construction of 100 F-86 Sabres, under licence, by Canadair, Ltd. It is officially forecast that Sabres and Avro Canada Canuck all-weather fighters will soon be "rolling off the assembly lines to equip the expanded squadrons being trained for them."

• • •

To meet the increased demand for passengers between the United Kingdom and the Far East, B.O.A.C. has introduced an additional Argonaut service between London and Singapore, thus providing two regular weekly connections with the twice-weekly flights now made between Singapore and Hongkong. B.O.A.C. and Q.E.A. together fly ten services a fortnight between London and Sydney, via Singapore. The Corporation also reports a record number of passengers (3,250) between Britain, the United States and Canada during August. Six additional Stratocruiser flights were made to augment the normal daily services on these routes.

New publicity manager to Venner Time Switches, Ltd., and Venner Accumulators, Ltd., of New Malden, Surrey, is Mr. Douglas Gibson, late manager of *Chemical Products*.

• • •

Mr. D. K. Forsdyke, who until recently was manager of the Kandy airport in Northern Nigeria, has been appointed Civil Aviation Officer to the Government of Cyprus. Previously Mr. Forsdyke was senior traffic controller at the overseas A.T.C.C. at Gloucester.

• • •

A cocktail party was held at the Northolt Airport Club on September 9, to celebrate the airport's 10,000th landing under the G.C.A. condition since the system was installed in 1948. Northolt thus becomes the second airport in the world to have handled 10,000 radar landings, the first being Gander (Newfoundland) where G.C.A. was in operation as far back as 1943.

• • •

Aluminium Laboratories, Ltd., announce the appointments of Dr. R. T. Parker, B.Sc., A.R.S.M., F.R.I.C., F.I.M., as director of research, and Mr. George Forrest, B.Sc. (Eng.), as associate director of research, at their Banbury laboratories. Aluminium Laboratories, Ltd., is responsible for the technical management of the Aluminium, Ltd., group of companies.

• • •

The twelfth aircraft in the S.O.30 Bretagne series has been delivered to Air France for trials on the company's routes. Forty of these aircraft are due to be completed by the end of 1951. The news that the Bretagne is shortly to undertake demonstration flights to several European capitals is expected to coincide with the announcement of a full C. of A.

• • •

Of great interest to prospective operators were the catalogue prices announced for some of the more prominent civil aircraft at the recent Farnborough show. Vickers Viscount, for example, may be purchased for £167,000, while a D.H. Comet is priced at £450,000. The Dove feederliner, in which U.S. operators are showing interest, is listed at £17,500.

• • •

The resistance of various airfield-surface materials to jet blast is being tested at Cardington, where the power-units of a Meteor —"anchored" to concrete blocks—are directed against a patchwork of various surfaces. Coarse tarmac, it is reported, is the most easily destroyed; asphalt is more durable, although kerosene causes it to deteriorate considerably.

• • •

The Royal New Zealand Air Force has ordered a Bristol Freighter equipped for aerial top-dressing; it will be used for economic testing under New Zealand conditions. A Freighter Mk. 31 recently gave a demonstration of top-dressing with superphosphate at Plynlimon and was later exhibited at the S.B.A.C. show.

• • •

Engineers of the S.N.A.S.E. factory, under the leadership of M. Jarlaud, are now constructing a jet-powered glider to be known as the Emouchet. Designed to permit glider pilots to make an initial climb to high altitudes, it is equipped with two pulse-jet units fitted under the wings. The first flight is expected towards the end of October.

• • •

The Governor of Fiji, Sir Brian Freestone, attended recently a meeting of the working committee of the South Pacific Commission last week in Sydney. Proposals for air services to link Fiji with other Pacific Islands were discussed. A survey flight was recently made over the projected routes and the report is now in the hands of the Fiji Government.

• • •

Ethiopian Airlines announce an operating profit of nearly £40,000 for 1949, a considerable increase over the figure for the previous year. Passenger-mileage rose by nearly 3,000,000 to some 8,989,307 miles. The company now operates nine Dakotas, one Norseman and one D.H. Dove; delivery of two Convairliners is expected in November.

• • •

Generally increased international airline traffic during the first seven months of this year is indicated by a rise of almost 10 per cent. in the total number of interline transactions handled by the I.A.T.A. Clearing House in London. The 35 members of the Clearing House were able to eliminate cash payment and foreign exchange dealings on 81.3 per cent. of the turnover for July by the offsetting of credit and debit accounts.

• • •

The Anglo-American Oil Co., Ltd., announces that a plant recently completed on the site of the original refinery at Fawley is now producing Paranox 56 additive for lubricating oils. This British compound will be known as Paranox 56GB to differentiate it from that of American manufacture. During the war, Paranox 56 was specifically recommended for use in Bristol engines.

JET BOMBING: In recent U.S.A.F. tests at Muroc, 500-lb bombs were dropped at speeds of over 500 m.p.h. from a B-45 Tornado

New Zealand has called for tenders for an air-freight service to link the two main islands of that country.

• • •

While visiting this country for the S.B.A.C. Show, Mr. Christopher Clarkson made it known that he would be remaining in his post of Civil Air Attaché at Washington, D.C., for another 12 months.

• • •

With the opening of Barrackpore, Calcutta now has a satellite airport which will help to relieve some of the congestion now being experienced at Dum Dum. Five companies are expected to operate passenger and freight services from the new airfield.

• • •

To assist Swissair in its present financial difficulties, the Swiss Government is to purchase ten of the company's aircraft. They will continue in operation and after ten years will be re-acquired by Swissair at the then prevailing value.

• • •

In addition to an initial order for 30 Martin 4-0-4's placed last June, T.W.A. announces an order for a further ten of these twin-engined 40-seat airliners. They will be used to replace slower equipment now operating on the company's medium- and short-haul routes.

• • •

A dance for past and present students of the Colleges of Automobile and Aeronautical Engineering (Chelsea) is being held at Victoria Hall, Bloomsbury Square, London, W.C.1, on Tuesday, October 17. Tickets from the secretary, 102, Sydney Street, London, S.W.3.

• • •

The growing importance of Montreal as an international terminal is signified by the inauguration of a regular service to and from Paris by Air France. The first flight is due to arrive at Montreal on October 3 and eastbound services will begin two days later.

• • •

For flights made at the S.B.A.C. Display at Farnborough, the Bristol Brabazon was insured for some £750,000, estimated to be half its actual value. The risk continued only while the Brabazon was warming-up, in flight or landing, the aircraft being uninsured when the engines were not running.

• • •

United Air Lines are converting seven standard 21-passenger DC-3s to accommodate 28 passengers. The project is designed to provide increased capacity for certain segments of the company's route network where, though load factors are high, the use of larger equipment is considered impracticable.

• • •

Latest in the Fouga series of jet-powered sailplanes, the Cyclope aerobatic trainer made a successful flight at Aire-sur-Adour on August 31. Like the Sylphe, which has been demonstrated in both Britain and America, the Cyclope is powered by a Turbomeca Piméné turbojet.

• • •

P.A.W.A. announces that, due to the unprofitable nature of the operations, services to Prague have now been suspended. This capital was previously served by Pan-American on a flight between Vienna and Munich on services from America to the Middle and Far East.

• • •

As handsomely produced as ever, the 1950-51 edition of the "Dunlop Aviation Year Book" (Dunlop Rubber Co., Ltd., Aviation Division, Foleshill, Coventry), has recently appeared. In its 90 large pages, it illustrates and gives technical data concerning products in the tyre, hydraulic, de-icing, armament-control and other fields for which the Aviation Division caters.

Fighter Armament

A Heinkel He 111 is raked by eight 0.303-in Brownings

By . . . . . A. R. Weyl, A.F.R.Ae.S.

PART II: German Equipment in the Second World War: Inefficient Intelligence

Though a surprising amount of armament was on view at the Farnborough Show, any new and highly efficient weapons which may now be under development did not, of course, appear. In this second instalment of his critical examination of fighter armament (the first appeared on August 24th) Mr. Weyl reviews the efficient equipment of the Luftwaffe, and castigates those responsible for intelligence-gathering at the end of hostilities. While not necessarily endorsing all his views, 'Flight' considers them worthy of serious study

THE Tedder "Air Fighting Committee," constituted in 1934 to study the requirements of airborne armament, instigated the multi-gun fighter, the reflector sight, and the mechanically driven turret. In March, 1939, the Air Ministry announced the issue of shell-guns for fighters. On paper, the 20-mm Hispano gun became the standard fighter weapon by the end of 1940, as a lesson learned from the Battle of Britain; but complete re-equipment took about three war years longer, because the gun type selected needed re-design. Actually, four 20-mm shell-guns as fighter equipment had been predicted for the R.A.F. in 1939.

In 1938, Rolls-Royce offered a 40-mm shell-gun as an existing airborne weapon. Though official tests made with this private venture proved promising, the weapon was rejected in favour of the Hispano gun. The latter was afterwards officially described as having been at that time still, more or less, in an experimental stage, besides being unpractical for installation in wings; also, from 1940 onwards the designers were inaccessible. Most of this was obvious in 1939, so the wisdom of the selection then made is open to doubt.

In September, 1939, the most modern British intercepters had batteries of eight (later 12) rifle-calibre Browning guns, giving high fire-density at close range. In addition, the reflector sight had been introduced, and certain modifications had rendered the ammunition more effective. But the permissible combat range had not increased, nor had the destructive action of hits improved.

During the critical days of 1940, only the fighter squadrons of the R.A.F. stood between survival of this country and domination by Hitler. Mr. Churchill (as Minister of Defence) and the three Chiefs of Staff clearly appreciated this fact and resisted all French pleas for a release of some of these squadrons to fight in France. Churchill, too, foresaw that if these fighters could successfully resist the onslaught of Hitler's mighty Luftwaffe, it would mean the beginning of the end of Nazi Germany. It was indeed so: the Battle of Britain broke the morale of the Luftwaffe. The enemy's force never recovered; in spite of the huge numbers of fighter aircraft built, and of the technical qualities of those aircraft and their armament, it never regained its offensive spirit.

When this most important air battle of the Second World War was fought, none of the British intercepters possessed shell-guns, in spite of the ministerial announcement made more than 18 months before. The vulnerability of the targets against rifle-calibre fire had substantially decreased; no increased fire-density could make up for this. Protected fuel tanks, as used in Luftwaffe aircraft to the surprise of British experts, reduced chances of destruction; there was armour protection for the crews; vital services had been duplicated, and the stressed-skin metal construction was not prone to collapse when pierced by bullets. Nearly all the attackers had two engines, hence there was a chance of limping home across the Channel if one engine was hit. Thus an amazing number of hits, fired from close quarters, was necessary to success in combat, and victories had to be dearly paid for. Fortunately, although the latest and most secret British gun turrets had been stupidly displayed to Milch, Udet, and other leading Luftwaffe experts ("to impress them"), the defensive armament of the German bombers had remained exceptionally poor. It was not through any merit of those trading in "security" that the Germans did not possess the power turret of contemporary British bombers (e.g., Whitley and Wellington); had the Luftwaffe bombers possessed such turrets, history might have had to be rewritten.

Luftwaffe Fighter Armament.—On the German side, shell-firing guns were already in evidence in 1939; they increased in number and performance when the Me 109 series were replaced by more modern aircraft. Also, the policy followed in armament development changed, becoming very intense indeed.

In Britain, the experts had plumped for a high-velocity gun, firing a shell with flat trajectory and short time of flight; this choice promised good chances of hits over wider ranges, and better penetration through armour. The German policy was less decided. For air combat, the advantages of a quick-firing, low-velocity gun (having less weight and recoil) were rated higher by fighter pilots than the slow-firing, heavy and cumbersome high-velocity gun: more emphasis was laid upon the destructive effectiveness of the shell.

Of the earlier Luftwaffe guns, the Oerlikon F.F. (with electrical cartridge ignition) was representative of this trend. It was soon superseded by far-better-developed designs, as, for instance, the 20-mm Mauser MG.151. This was admittedly superior to the British Hispano gun, as comparative tests have confirmed. The MG.151 was followed by the gas-operated type, MG.213/C, of the same calibre but still more highly developed for air combat; and finally by the 30-mm MK.108 and by the peak achievement in gun design, the 30-mm MG.213/C/30. The last-named type still has no known equal in the world; it fired 1,100 rounds per minute, an amazing performance for this calibre.

These far-advanced guns utilized electrical firing of cartridges—a 1917 invention by Vickers—in lieu of the striking of a percussion cap by a firing pin. With this system, the round is practically insensitive to shock or heat (and may, therefore, be roughly jerked about in the gun), is more reliable in ignition, and can safely be used in unlocked breeches. Without this feature German gun design would scarcely have prospered so greatly. Moreover, it permitted convenient gun synchronization, for which purpose it was

originally invented. Its introduction was, of course, a flagrant breach of the tradition of using army ammunition, to which system all airborne armament had previously been pledged. The lame excuse heard here that electrical ignition would be unreliable has been disproved sufficiently by facts established by operational usage.

Admittedly, certain of the later Luftwaffe guns, the Rheinmetall MK.108 and the Mauser MG.213/C in particular, were not yet fully developed when pressed into operational service, and thus were not quite free from teething troubles. This is not surprising in view of the extremely short development times and the war conditions prevailing. On the whole, it must be said that the intensified German development achieved its purpose well: useful weapons were evolved for air interception which are still unequalled anywhere. Modern Russian fighters use guns of German war-time design. Unfortunately, as will be seen, this country helped to provide Soviet Russia with the German experts she needed.

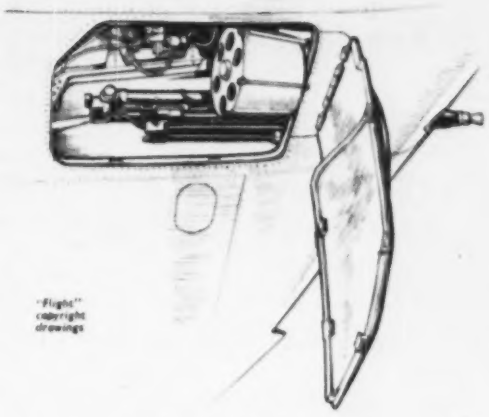
Hard pressed by the Allied air offensive, the Luftwaffe armament technicians were prodded into still greater activity to provide weapons for intercepters. One task was to supply large-calibre shell-guns for attack over wide ranges and with a certainty of destroying by a single hit or a near miss. Another approach concerned self-propelled missiles, i.e., rockets. Such air-to-air rockets must not be confused with the ground-attack rockets used by British fighters: the latter are sub-sonic in speed of flight, while the former must travel at supersonic speed if they are to replace gun shells.

With improvised spinning rockets, a first and noteworthy success achieved against American bombing squadrons (near Schweinfurth, on October 14, 1943) led to further intensified development. As a result, one of the most successful and promising air-combat weapons was created, the R.4/M, a 4-kg high-explosive rocket ("M" stands for "Mine," i.e., thin case with substantial high-explosive charge, signifying that the projectile depends primarily upon blast for its effectiveness).

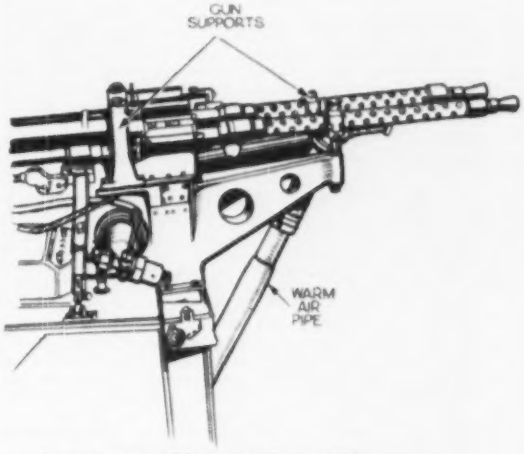
This country could easily have taken a similar step forward towards effective intercepter armament: as early as the spring of 1941, detailed proposals for a supersonic air-to-air rocket missile were submitted to M.A.P., only to evoke a curt refusal of further consideration by the Millbank omnipotents. A post-war comparison of the 1941 proposals with those followed by Luftwaffe experts with so great a success showed that the designer had been on the right track, and that it was the official experts who had blundered and erred once again.

The general assertion that, because the Germans lost the war, their fighter armament cannot have been any good, does, of course, not apply to the matter under consideration here: it is established, from unchallenged air-combat statistics, that the latest Luftwaffe fighter armament actually had an alarming technical and tactical superiority when Germany surrendered. At the end of 1944, the armament of the Me262 jet fighter—delayed by Hitler's "intuition" that this type should be used as a day bomber—was standardized at six 30-mm Mk. 108 guns (to be replaced by MG.213/C) and 48 rockets; for long-range attacks a 50-mm MK.214-A gun, with rigid installation, was scheduled early in 1945 and probably used. Single-engined jet fighters, it was decided, should have three 30-mm guns and up to 60 R.4/M projectiles. On the British side, most fighters had not even yet the standard equipment of four 20-mm guns, and American fighters had no shell-guns at all, but relied on 0.5-in machine guns

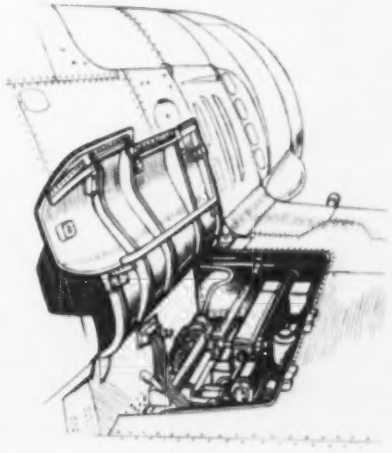
Armament ranges increased steadily, but not to the extent which had been anticipated in the light of aircraft speeds and consequently decreased manoeuvrability. Average combat ranges rarely exceeded 400yd for firing and even at 300yd fire was but seldom opened. Gun stoppages were of less common occurrence than during the First World War. In the Second War, with the rifle-calibre Browning machine-gun a stoppage occurred, on the average, once per 15,000 rounds fired, while with the Hispano gun, in 1944-45, the 2nd Tactical Air Force experienced one stoppage per 1,500 rounds fired. Reasons for the relative all-round improvement were

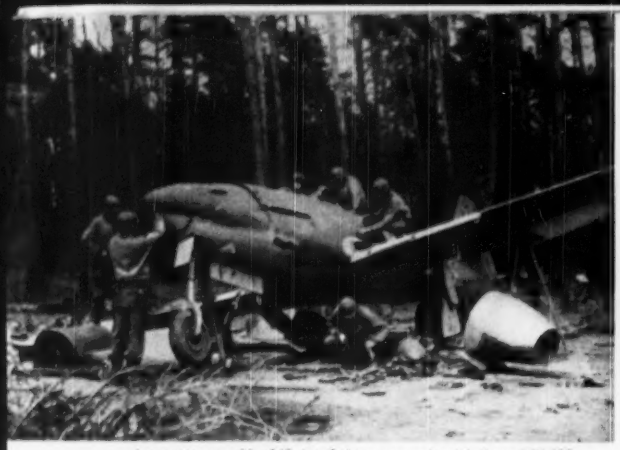


Outboard 20-mm Oerlikon FFs on FW 190A

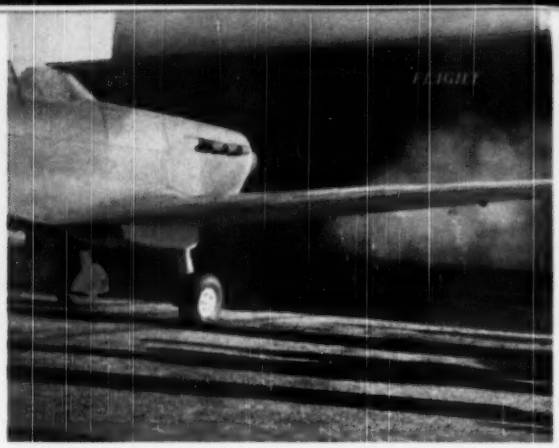


Fuselage-mounted 7.9-mm MG.17s (FW 190A)
(*Below*) Inboard 20-mm MG.151/20s on FW 190A





Inspecting an Me 262 jet fighter, armed with four MK.108 guns of 30-mm calibre, ammunition for which is seen strewn about



A Spitfire eight-gun fighter at the stop-butts. Empty cases are seen streaming from the ports in the bottom surface of the wing

the better installation of weapons, and abandonment of synchronizing gears, and qualitative improvement of the ammunition.

Otherwise, precisely the same difficulties were experienced during 1939-45 as during 1914-19—proving that, in weapon design, little progress had been made. Gun mechanisms froze at altitude, so research for anti-freezing lubricants and for heating the mechanism had to be conducted all over again—after 21 years. The hoary problem of belt design and cartridge lubrication was rediscovered, and the old need for mechanical cartridge-conveyance, by way of power-driven belts, turned up again. Finally, the absorption of recoil loads presented the same headaches as were experienced during 1914-18.

Allied Investigation of Enemy Equipment.—When the long-anticipated collapse of the Third Reich took place, a wealth of technical information on technical equipment became available to the victors. As the Germans were well aware of the Russian methods of treating conquered people, it was but logical that all their technicians and scientists (or, at least, all those with a relatively clear conscience and without Communist allegiances) turned to the Western powers, proffering their information and services. The majority of these Germans had worked for Hitler simply because they happened to be specialists or civil servants, and not because of any particular enthusiasm for the Nazi cause. It is easy to blame armament specialists for deeds committed with their work, but it is hard to see what else these should have done, short of committing suicide.

Armourers display the belts and feed mechanisms of wing-mounted 20-mm British Hispano guns in a Hawker Hurricane

This readily proffered wealth of information was gathered and compressed into reports by a brigade of very official Allied investigators (nicknamed by the Germans "irrigators") who were dispatched to Germany in various appropriate disguises. Most of them tried hard to oblige, but few succeeded. The majority had been recruited from those who knew their subject but were blissfully ignorant of the German language and of the mentality of the people they had to interrogate; those who knew German but had no inkling about their subject; and a few who knew neither but had managed to pull the right strings. Some behaved in a frankly hostile manner and thus defeated the purpose they were sent for. Others were uninterested, labouring under the illusion that "the Huns" had nothing to offer, and treating scientists of world-wide reputation like mischievous guttersnipes.

The outcome was that much valuable intelligence was lost or, worse, presented to the Russians. The latter were, in fact, far more appreciative of German armament and eager to exploit German experts. In spite of an agreement to exchange information, the Russians also took great care to suppress or destroy evidence which might have fallen into the hands of their Western allies. Ample and early proof of this endeavour were the "displaced persons" who painstakingly destroyed files and instruments in the huge Volkenrode establishment and elsewhere. Many of the leading German experts, too, were accosted by Communist agents and "advised" not to divulge their secrets to the Western powers. In some cases, this happened under the very noses of the investigators.

Fighter-armament information was among the material thus lost; but, in addition, it is fairly evident that little use has been made of all the information and booty which *did* reach this country. Even the personal prejudices of interrogators seem to have been allowed to exclude proper assessment. In a case known to the writer, an eminent German expert, with many years of most valuable experience and of untarnished political background, was conceded *one* interview with the interrogator; as the German, somewhat tactlessly perhaps, failed to agree with a technical opinion held by the interrogator, he was then dismissed and categorized as useless for employment in this country. Worse, when the attention of the authorities was drawn to this appalling misjudgment, the action was merely endorsed without investigation. As this case concerns modern intercepter equipment, it deserves mentioning here.

It also seems that British officials held out promises that aircraft-gun design-teams of the Mauser firm and of Rheinmetall-Borsig would be given a chance to complete promising developments in this country. Apparently, the policy was then changed, and the unemployed German specialists were left to join the Russians.

(to be continued)

OVER AFRICA

Part 1: The Journey South: Nairobi's Airfields: Livingstone and Victoria Falls

By THE EDITOR

(Illustrated mainly with "Flight" photographs and drawings)

IN connection with the recent opening of Livingstone Airport, the editor was invited to fly on a special B.O.A.C. service from London to South Africa in the Handley Page Hermes fleet flagship *Hannibal*. There was so much to be seen and done in a short time that of necessity, visits, meetings, and inspections were brief; nevertheless, a great many impressions were gained, the personal opinions of some influential people in aviation in Africa were noted, and a deal of other information was gathered.

Were they capable of doing so, both Livingstone's airport on the occasion of its official opening, and the new Hermes during its several demonstrations, could justifiably feel flattered by the attention they received.

Observations on the journey to Johannesburg, on Nairobi's airfields, and Livingstone's inaugural day, appear in this instalment.

London Airport to Nairobi.—A crew, a small party of passengers and some additional crew members, together with a well-stocked pantry and bar and sundry spares and baggage, took off in the Hermes in the mid-morning of Monday, August 7th, to cover the first section of the journey to Nairobi, Kenya, *via* Castel Benito (Tripoli) and Khartoum. It was planned to fly on to Livingstone and Johannesburg without undue delay and to demonstrate the aircraft on a more leisurely return flight.

The first stage, over France and across the Mediterranean —6½ hours' flying—was made at quite low altitude, taking little advantage of the Hermes' modern air-conditioning equipment or its speed at altitude. A brief storm over the Mediterranean was the only event during a comfortable flight.

Last warm evening light saw a procedure approach and smooth landing at Castel Benito, where the party was at once made very welcome. A partial strike was reported to be in progress at Khartoum among the native staff, and no aircraft could be accepted until 7 a.m. local time. Thus the Hermes party had just time before an 11.15 p.m. take-off to partake of outdoor dinner at the unusual ex-Italian Uaddon Club (a uaddon is a kind of antelope) on the seafront at Tripoli, several miles to the north. On the drive back to the airport in two ancient taxis, the yellowing headlamps picked out an occasional desert rat leaping away like a small, sedate kangaroo. More than one train of slow, patient camels, lumbering along in darkness, also loomed up unexpectedly. Occasional flashes of lightning away to the south looked ominous.

It frequently happens that before a flight—and, often, shortly after landing—a series of stories and rumours, generally of the improbable kind, circulate among passengers and in no time versions vary even more than the proverbial message passed down the fighting line by word of mouth: "We are going to advance, send reinforcements," eventually received as "We are going to a dance, send three and fourpence." In this case both the one regarding hailstorms over the Sahara and the other concerning a strike at Khartoum, proved to be true.

At Khartoum: the stewardess leads the way for embarkation

Hannibal is refuelled and inspected in front of the hangar at Khartoum

Eastleigh Airport, Nairobi. The civil buildings are on the west side

The Hermes IV poses near the well-known signpost at Eastleigh

Passenger-handling section at Eastleigh, operated by East African Airways Corporation

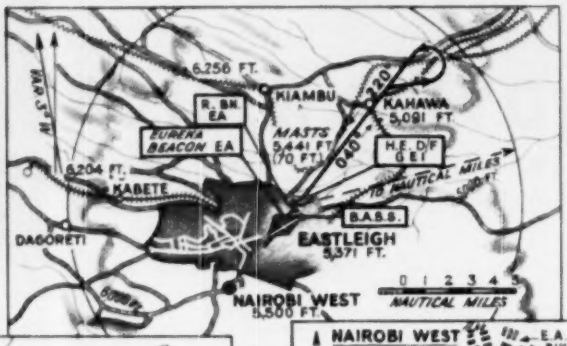
AFRICA'S AIRPORTS . . .

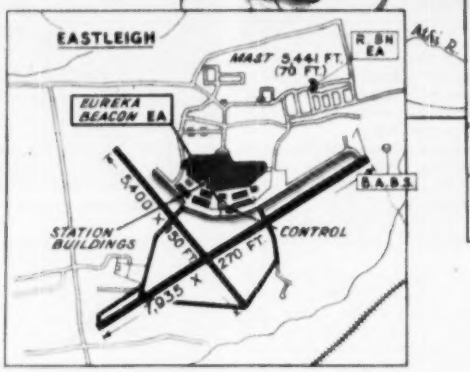
Very soon after take-off with a new crew led by Capt. Veasey, passengers settled down in their large and comfortable adjustable Vickers-built chairs for a night's sleep—which most managed to get.

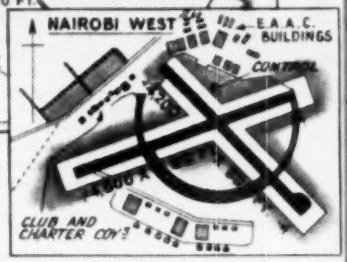
"Met." briefing, which included a warning of high-level thunderstorms over the Sahara, seemed almost unbelievable, but weather has been strange in most parts of North Africa this year, and Khartoum, for example, has had more rain in recent months than some of the oldest inhabitants can remember ever before. This, incidentally, has led to considerable inconvenience and expense because the few roads and railways have been washed out. Thus, trunk-line aircraft have had to be re-routed and shuttle services run because no petrol is left for them, and none can be got through by rail from the coast. It has even proved expedient to fly petrol into Khartoum.

The damp heat of the early morning at Khartoum was by no means unbearable, and with the minimum of delay the Hermes took off again for the cool heights of Eastleigh Airport, Nairobi, leaving behind the town—said to be laid out in Union Jack form—in the junction of the Blue and White Niles and its even more remarkable twin city of Omdurman on the west bank.

From Khartoum the track lay over desert and later swamp and scrub, much of which was cloud-obscured. For many miles at the start the White Nile showed the way, the vegetation on its fertile banks fighting back the ever-infiltrating sands. In the open desert tiny camel caravans filing slowly along invisible paths are an endless source of amazement to those flying overhead. Visibility is frequently fifty or more miles in all directions, yet seldom can a sign be found of where these men or animals come from or where they are going. Only the blazing red sand dunes are to be seen.







Nairobi's airfields, their runways and facilities. The Embakasi project would be in the area occupied in this plan by the scale

Nairobi and its Airfields.—It is winter in Nairobi, and the temperature is much like that of our summer at home. Rain-clouds threaten most of the time, but seldom seem to release their moisture. Nairobi's main airport of Eastleigh is a critical one on the Springbok route, being 5,370ft above sea level, and frequently having a density altitude in the hot season of over 7,000ft. For this reason it is frequently used for performance tests. It is basically an R.A.F. station, Nairobi West being the civil airfield used by internal services and light aircraft.

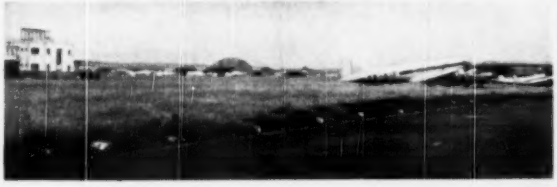
Recently raised to the status of city, Nairobi is something of a disappointment to a first-time visitor. It contains few buildings of merit, and is in the main a straggling, untidy place with African and Indian slum areas. The residential outskirts, however, are in parts most attractive, and much of the surrounding country is also very pleasant. Only one hotel (British-owned) seems to be worth remembering.

East African Airways Corporation look after B.O.A.C. interests as well as their own, and make a very good job of it indeed. For at least twenty out of each twenty-four hours an attractive hostess is on duty at the Norfolk Hotel to sooth and instruct tired and crochety passengers from, or for, the many aircraft which pass through or night-stop in the area, while the handling in the civil buildings at Eastleigh seemed to be most efficient.

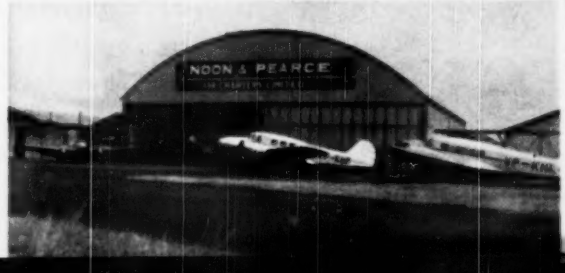
Eastleigh—The Embakasi Proposal.—The question of Eastleigh airport's future has been under discussion for some two years.

Nairobi West, with (lower left) the East African Airways buildings

Nairobi West panorama, with the new control tower on the left



Premises and aircraft of one of the charter operators based at Nairobi



Local interest displayed in the Hermes IV on its arrival at Nairobi

The passenger-handling buildings at Livingstone's new airport

Livingstone's modern control tower and administrative block

In June, 1948, an M.C.A. mission under Mr. Vincent examined the position and recommended a 400-yd runway extension, but this would be most difficult to implement either at the S.W. or the N.E. end, for the former would take in a river and the latter involves an extension towards the main built-up areas and Secretariat Hill, which neither the city authorities nor the R.A.F. would agree to. The cost might be £1 million. Eastleigh also has other drawbacks regarding runway gradient, approaches and siting of equipment for landing aids. A plan accompanies these notes.

Thus, to bring the airfield up to the standard likely to be required in a few years' time seems almost impossible, and the alternative is a new site altogether. This is not so drastic a move as it might appear, for the ground now occupied by Eastleigh would be a most valuable acquisition to the city for expansion and its sale should bring in well over £500,000 at present values. A good new site is available three or four miles away at Embakasi on the Athi plains to the south-east of Eastleigh. The real problem in the event of a move—in addition, of course, to the expense—is that of moving the many R.A.F. buildings, erection of which would cost £4 million, it is said.

The Director of Civil Aviation, Cdr. Stacey Colls, knowing how long the making of a first-class airfield can take, is most anxious to obtain a decision soon, and is understood personally to favour the Embakasi proposal. There, a preliminary survey has indicated the existence of flat ground, more than adequate space, and clear approaches. The soil and subsoil are also good for the purpose. An estimated cost for the new field and runways alone is £2 million, which, when the sum received from the sale is deducted, is not very different from the cost of extending Eastleigh.

A possible solution to the R.A.F. building problem would be their retention and the construction of a direct-access road from Embakasi to the present site. Its length would have to be about three miles.

Nairobi West.—This field is undergoing some development, especially since East African Airways Corporation started to use it as their main base; it is not, however, suitable for trunk-line aircraft in size, surface or facilities. About six months ago a new control tower was completed, and E.A.A.C., now installed in hangars on the north side, have built up good, almost self-contained, servicing facilities. International Aeradio, Ltd., also have a department, which looks after the radio needs of the local operators.

Sharing Nairobi West with the Flying Club of East Africa are several small operating companies such as Noon and Pearce Air Charters, Ltd., who have five Geminis, two Ansons and two Rapides; Campling Bros. and Vanderwal, Ltd., with Piper Cubs and Bonanzas; Clairways, Ltd., who have Ansons; Harward, Maclachlan and Co., Ltd., who have a Proctor V; and African Air Cars, Ltd., with an Anson and Proctors. The Kenya Police Force also operate an Auster V/J1.

As an example of rates charged for air taxi work, Noon and Pearce offer their Rapides at 3s a mile, Ansons at 3s 3d, Geminis at 2s 3d and, by arrangement with the owners of the aircraft, a Messenger at 1s 9d a mile and an Auster 1s 6d.

The club, operating Tiger Moths and Auster Arrows, has some 400 members, of which a hundred fly. Rates are £5 per hour dual and £3 10s solo. A pleasant clubhouse with restaurant and bar is situated at the south side of the airfield.

Several large hangars are at present used for storage purposes but may later be made available to aircraft. Nairobi West is 2½ miles S.S.W. of the city centre, and has two main runways of all-weather murram surface (see plan). Gooseneck flares are laid out for night flying. The altitude is 5,500ft.

A description of the progress made by E.A.A.C. since its formation after the war, and of its fleet and routes, will be given in a later instalment.

After a two day stop-over in Nairobi the Hermes took off on the next leg of its journey—the flight to Livingstone, Northern Rhodesia. This was until quite recently principal town of the province.

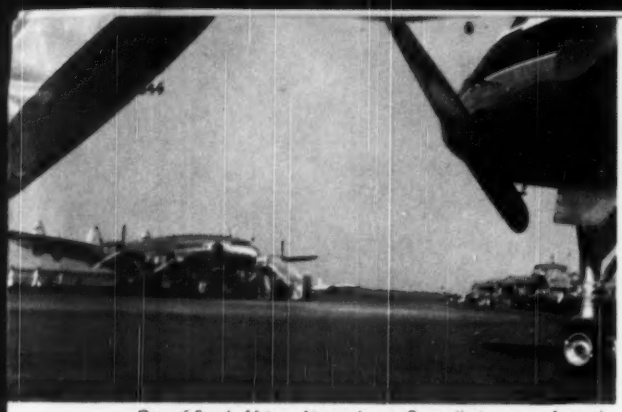
Livingstone.—Although on a non-scheduled flight, the Hermes gave a lift to some 15 stranded passengers, Livingstone being reasonably near to their intended destination of Salisbury. The Hermes made no fuss about the Nairobi take-off and had at least 400yd to spare. The six-hour flight south to Livingstone again passed pleasantly and uneventfully. We flew higher and faster than previously.

Quite early, while the sky was still clear, we had a good view of Kilimanjaro on the port side, and later passed over some lesser volcanic peaks and many lakes. Soon afterwards medium cloud closed in below. Roughly mid-way between Broken Hill and Lusaka the Hermes overhauled the Solent, some 8,000ft below, carrying Lord Pakenham to Livingstone. The crew sent a message about getting a move on, and received a counter-thrust about landing gear and crowbars.

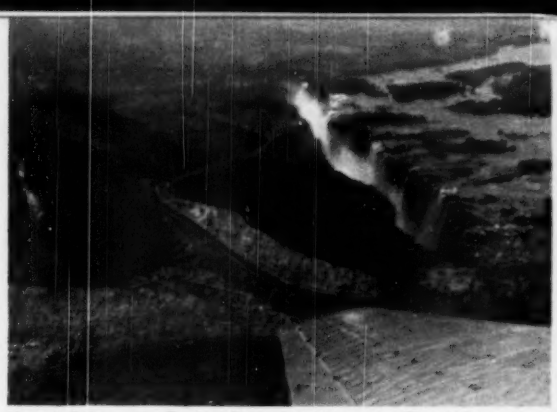
At this time the Hermes was flying at 18,200ft (cabin alt. 6,000, or −4.5 lb/sq in differential) at an indicated 167kt. Engine dials showed 2,200 r.p.m. and 37.5in boost. The density altitude was nearly 21,000ft with outside air temperature of +2 deg C. The Hercules power output averaged 1,035 b.h.p. for each unit as calculated from a torquemeter reading of 460× r.p.m. over the constant of 963. Auxiliaries account for about 25 b.h.p. outboard and 45 b.h.p. inboard and must thus be deducted.

Before landing at Livingstone's fine new airport we circled Victoria Falls, marvelling at their beauty and at that of the upper part of the wide, island-filled Zambesi River. Below the falls the river flows in a fantastic zig-zag gorge which it has cut deep into the rock through countless years. During our stay in Livingstone, Northern Rhodesia, we were accommodated at the beautiful Victoria Falls Hotel—a somewhat Irish statement, perhaps, for the hotel is, in fact, several miles from Livingstone town, and across the border into Southern Rhodesia. From the hotel gardens one may look up the gorge toward the falls with the spray rising high in the air, even at this low-water season. The roar of the water can be heard clearly.

An exceptional shot obtained by B.O.A.C.'s chief photographer as the Hermes circled Victoria Falls during a demonstration flight



One of South African Airways' new Constellations seen from the shadow of the Hermes' wing at Palmietfontein Airport, Johannesburg



Victoria Falls, on the Zambesi River near Livingstone. The photograph was taken through the double windows of the Hermes

AFRICA'S AIRPORTS . . .

The small Victoria Falls airfield continues to be used for light and medium aircraft. Central African Airways Corporation is based at Salisbury, 300 miles to the east, while Lusaka to the north is the administrative centre for Northern Rhodesia.

A description of Livingstone Airport and a brief account of its opening have already been published (*Flight*, August 10 and 17 respectively). Most visitors were agreeably surprised at what they saw. The buildings are in most attractive and colourful modern style and the main reception hall and restaurant are tastefully decorated. A screen comprising one complete wall of the dining-room deserves special mention, for it is made up of separate glass panels of double thickness, between which are pressed and sealed examples of all the grasses of Rhodesia. These are no mere tufts but artistically laid out specimens—all of great beauty.

A cocktail party, dinner and dance which concluded a day of festivity for Livingstone also marked the end of the first stage of *Hannibal's* flight. On the following day the journey south to Johannesburg was made and a programme of demonstration flights continued.

Though by no means unappreciative of the efforts of those taking part, the large British contingent for the opening display at Livingstone were probably more impressed by the gathering at this small and rather remote centre of so many people closely connected with aviation in Africa than with the flying demonstrations. In England we are spoiled, and may even have become *blasé*, as a result of seeing such brilliant demonstrations as those at the S.B.A.C. Show and the R.A.F. Display. It must be added, however, that the S.A.A.F. Vampires could hold their own in any company, and their exciting display showed signs of the influence of both British and American jet aerobatic teams.

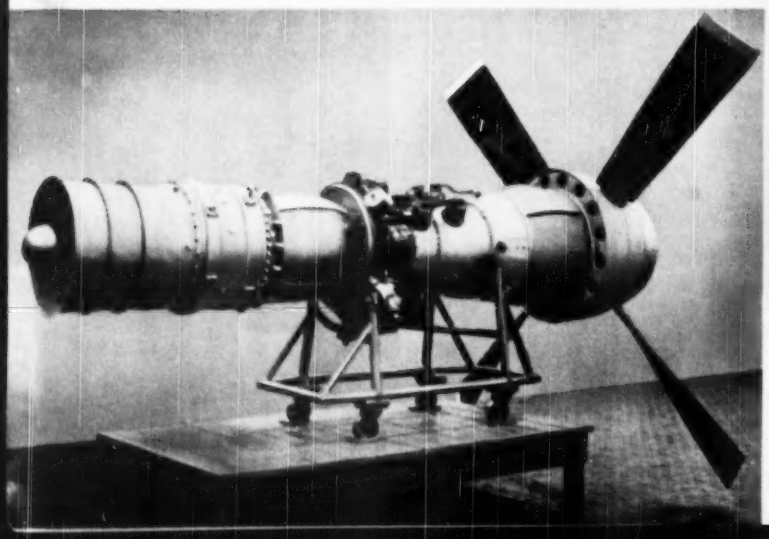
Lord Pakenham chose the B.O.A.C. flying-boat service for his journey out to Livingstone, landing at the nearby Zambesi River base. He returned by the faster South African Airways Springbok Skymaster service. Present with the Minister for the opening ceremony were Sir Arnold Overton, permanent secretary of the Ministry of Civil Aviation; Sir Miles Thomas; and Sir Godfrey Huggins, prime minister of Southern Rhodesia; and Brigadier G. G. Ross, director-general of civil aviation in South Africa.

Before Lord Pakenham's address Mr. R. C. S. Stanley, the acting governor, welcomed official guests by name, and talked at length about Livingstone Airport, its planning, construction, and those responsible for it. He also read messages from Mr. Sauer, South African Minister of Transport: "My congratulations on the achievement of the Northern Rhodesia Government in the completion of your fine airport." From Sir John Kennedy, Governor of Southern Rhodesia: "I should have liked to be present at the opening ceremony of your new airport which will contribute so greatly to the development of Central Africa." The Right Honourable James Griffiths, Secretary of State for the Colonies: "My hope that the traffic which will use the new airport will contribute materially to prosperity." Sir Gilbert Rennie, Governor of Northern Rhodesia (on leave in England): "Unforseen and perplexing technical difficulties have been met with in the course of construction but have been successfully overcome by determined efforts and good teamwork. I congratulate all who are responsible for the satisfactory completion of this fine airport."

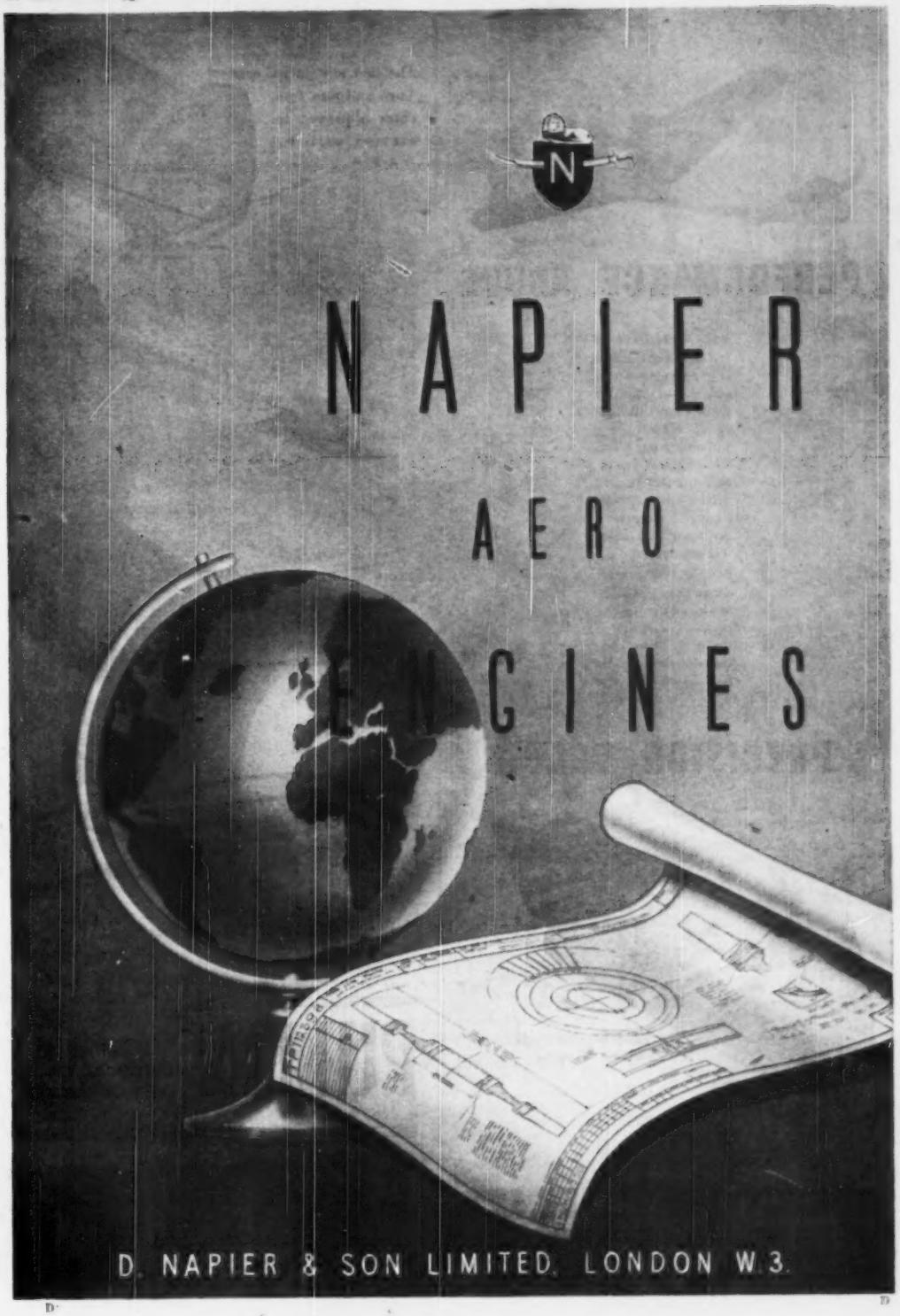
Johannesburg.—A trip lasting little more than two hours brought us over Pretoria, the great belt of gold mines and Johannesburg itself, where a landing was made at Palmietfontein Airport. The purpose here was to show off the Hermes and, incidentally, to be present at the naming ceremony of one of South African Airways' new Constellations. These aircraft are about to replace Skymasters and by mutual agreement to operate the Springbok South African-London service in conjunction with B.O.A.C. Hermes. Flying-boat services are, of course, about to be withdrawn. The four new S.A.A. Connies of the latest type are named after Union cities, Johannesburg, Cape Town, Durban and Pretoria. The Connie's best qualities appeal particularly to the operator, but during a one hour's flight in *Cape Town* we were left in little doubt as to its passenger appeal also. It is, in fact, almost as comfortable and well-planned as the Hermes, although the crew stations are obviously of an earlier design. Being a fairly long-range aircraft, a crew rest compartment is provided which is not to be found in the medium-range Hermes. Zero Readers are fitted, and will probably be the first to go into operation.

(To be concluded)

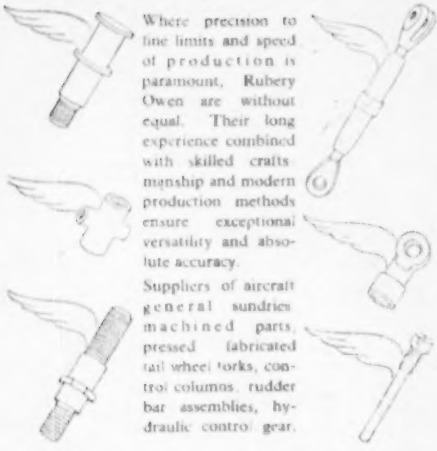
AMERICA'S LATEST TURBOPROP



The new Pratt and Whitney T-34 turboprop of 5,700 h.p., mentioned on page 331, is now being flight-tested in the B-17 above, seen with all four piston engines feathered


N
NAPIER
AERO
ENGINES
D. NAPIER & SON LIMITED. LONDON W.3.

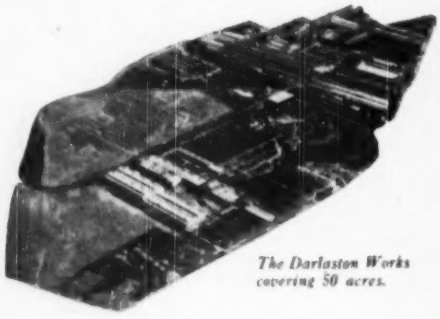
PERFORMANCE ABOVE



Where precision to fine limits and speed of production is paramount, Rubery Owen are without equal. Their long experience combined with skilled craftsmanship and modern production methods ensure exceptional versatility and absolute accuracy.

Suppliers of aircraft general sundries, machined parts, pressed fabricated tail wheel forks, control columns, rudder bar assemblies, hydraulic control gear.

PRECISION BELOW



The Darlaston Works covering 50 acres.

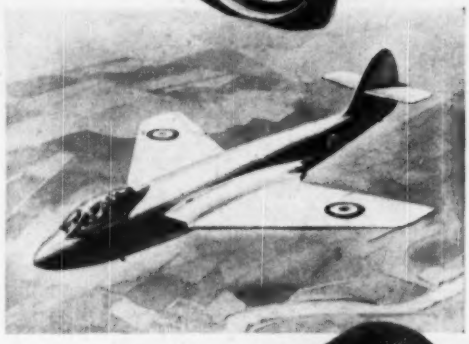
RUBERY, OWEN & CO. LTD.

DARLASTON · SOUTH STAFFS.

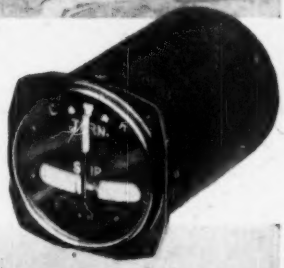
MEMBER OF THE OWEN ORGANISATION

LONDON · BIRMINGHAM · COVENTRY · MANCHESTER · SOUTHAMPTON · WREXHAM

The first and only Electrical Turn and Slip Indicator approved for service with the R.A.F.



"Proving your indicators are in every way satisfactory on the Armstrong Whitworth Apollo."



PULLIN *Precision*

ELECTRICAL TURN & SLIP INDICATORS

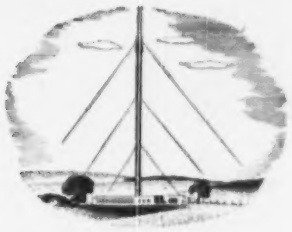
1000 hours between Overhauls

For full details write direct to the Sole Manufacturers

R. B. PULLIN & CO. LTD.

PHOENIX WORKS, GREAT WEST RD., BRENTFORD, MIDDX.

Telephone: EALing 0011/3 & 3661/3. Telegrams: Pullinco, Wesphone, London



A GREAT NAME

is a promise fulfilled

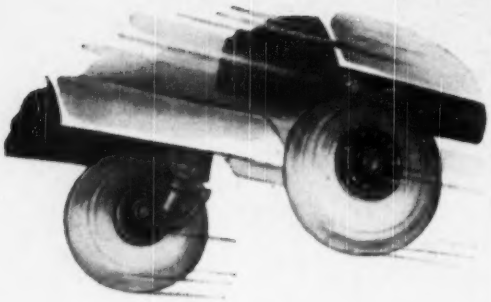
The Marconi Company's promise has always been a very simple one, and has been the same ever since Marconi conducted his first radio experiments over fifty years ago. That promise is this – to lead the way, through unremitting research, in the application of electronics to the public's needs, safety, comfort and entertainment. The world-wide acceptance of the name Marconi is evidence enough that this promise has been faithfully kept.

Marconi

THE FIRST AND GREATEST NAME

in Wireless

MARCONI'S WIRELESS TELEGRAPH COMPANY LIMITED · MARCONI HOUSE · CHELMSFORD · ESSEX



AIRBORNE!

A great deal of hard work is entailed before a plane is finally 'airborne'. Ask the men who build them where they get the components and the most likely answer will be "From Aircraft Materials"—and they know that in building the aircraft that compass the earth, only the best is good enough.

From the famous "POP" rivets to the smallest nut and bolt, Aircraft Materials offer a complete service to the industry. All component parts, ferrous and non-ferrous metals, conform strictly to AGS, AS or DTD specifications.

AIRCRAFT MATERIALS LIMITED

MIDLAND ROAD, LONDON, N.W.1. TELEPHONE: EUSTON 6151

SKYHI

HYDRAULIC *Aircraft*

JACKS

MODEL S.869

Specially designed for dealing with **TWIN WHEEL AIRCRAFT** as the narrow width of the Jack enables it to go between the twin nose wheels

Ball or Flat Head as required

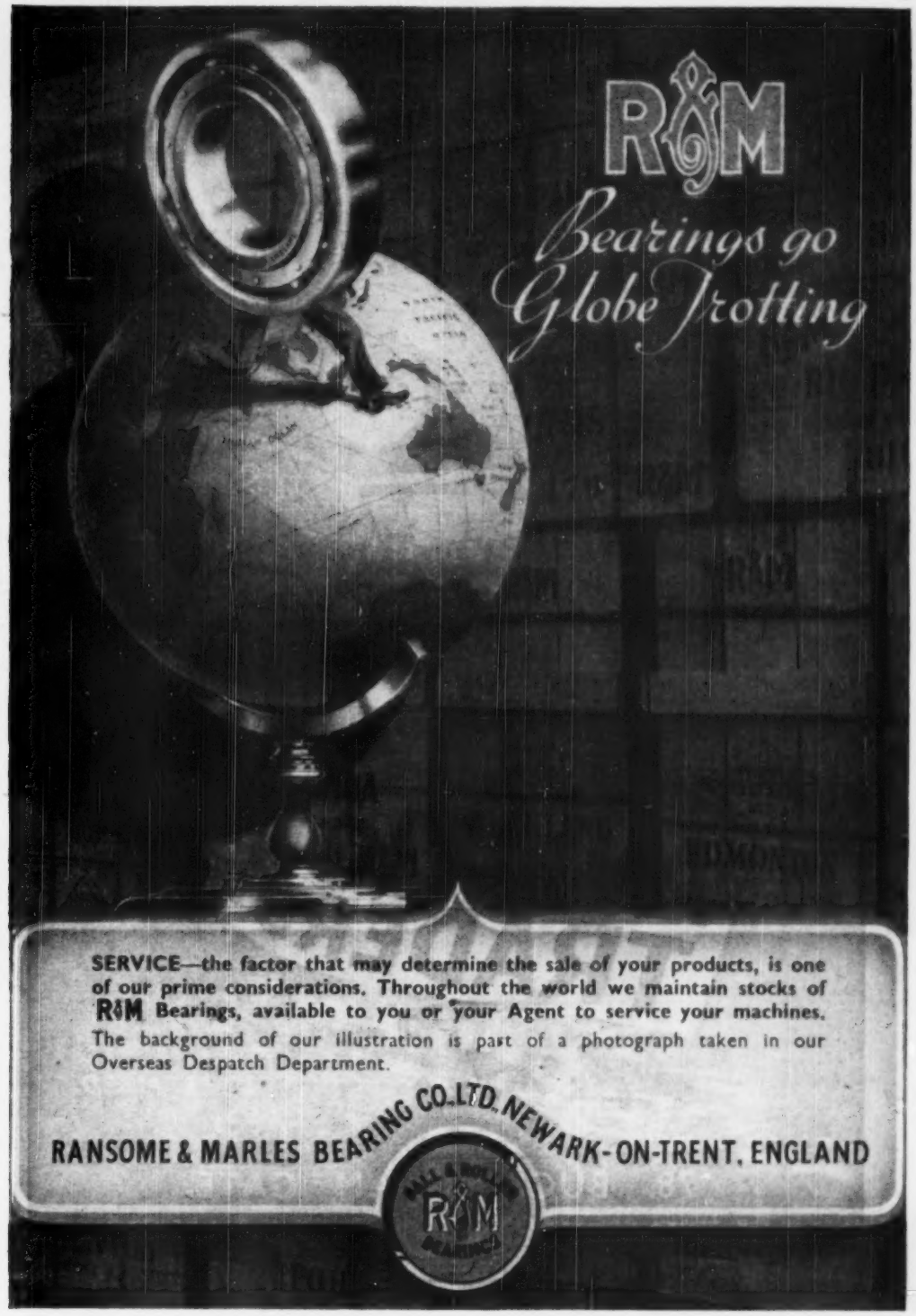
MODEL S.869 **18,000 lbs.** Capacity
6 in. Closed Height. 6½ in. Hydraulic Lift.

MODEL S.2061. **38,000 lbs.** Capacity
11 in. Closed Height. 11 in. Hydraulic Lift.

SKYHI LIMITED

SKYHI WORKS, WORTON RD., ISLEWORTH, MIDDX.

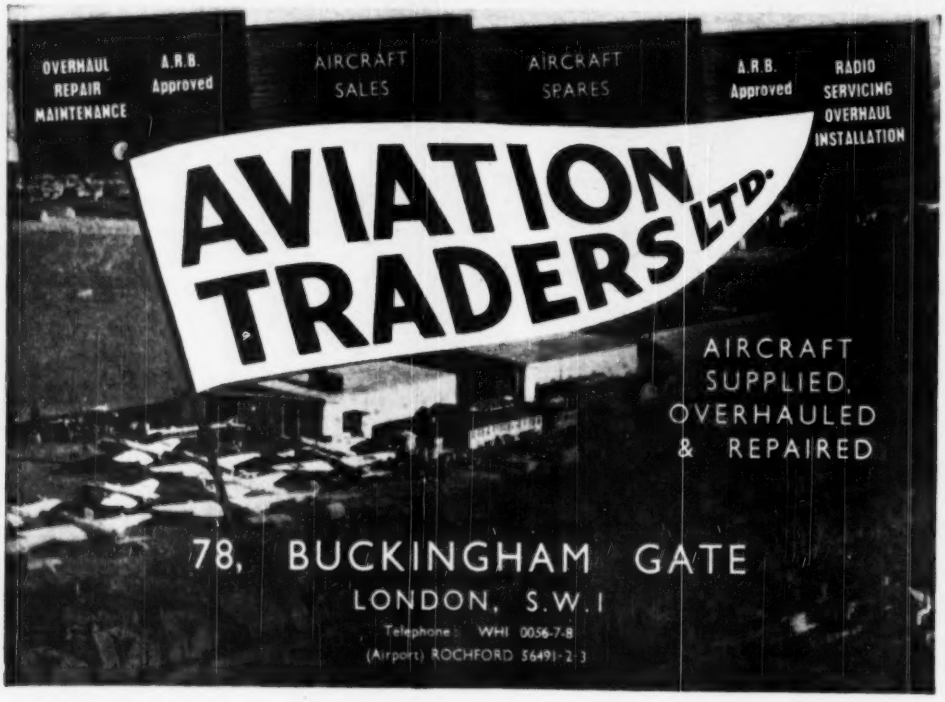
Telegrams: Skyhijack, 'Phone, London. Telephone: HOUnslow 2211-2-3


R&M
Bearings go
Globe Trotting
SERVICE—the factor that may determine the sale of your products, is one of our prime considerations. Throughout the world we maintain stocks of R&M Bearings, available to you or your Agent to service your machines.
The background of our illustration is part of a photograph taken in our Overseas Despatch Department.
RANSOME & MARLES BEARING CO. LTD. NEWARK-ON-TRENT, ENGLAND
R&M

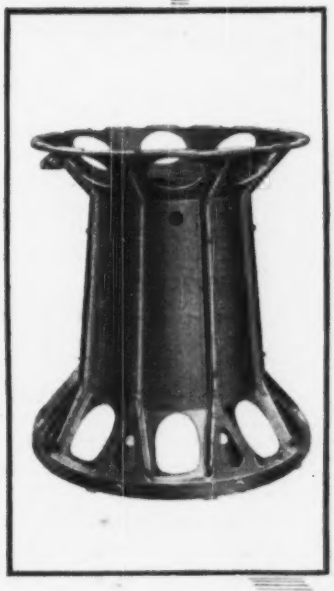
Brown Brothers (AIRCRAFT) Ltd.

Aircraft and General Engineers

HOUGHTON ROAD · NORTHAMPTON



YET ANOTHER ACHIEVEMENT



This Component is part of the Engine Mounting. It is a sheet metal sheath of cylindrical shape which bolts firmly on to the engine mounting ring. It encloses the compressor casing and supports the forward end of the compressor and gear casing.

Produced from Alloy Steels in our fabrication department, electric arc welded to close limits, representing sheet metal work craftsmanship at its highest level.

Manufactured on behalf of The Bristol Aeroplane Co., and will be incorporated in the Proteus Engines used on Brabazon II.

TB
BILSTON

THOMPSON BROTHERS (BILSTON) LTD

BRADLEY ENGINEERING WORKS · BILSTON · STAFFS

TELEPHONE BILSTON 41264/8 TELEGRAMS THOMPBROS BILSTON

LONDON OFFICE : ALDWYCH HOUSE · ALDWYCH · W.C.2 · Tel Holborn 1416

Westland Wyvern

Britain's first turbo-prop fighter is fitted with

'MARSTON' FLEXIBLE FUEL TANKS

MARSTON EXCELSIOR LIMITED
(A subsidiary company of Imperial Chemical Industries Limited)
FORDHOUSES, WOLVERHAMPTON

MAR.21

PLOTTING

A Pampas in Peru

is easier with

WILLIAMSONS AIR SURVEY EQUIPMENT

The South American Indians generally feel hostile to one and all, so heaving their weight about has tremendously taken their fancy. Nevertheless, they should be reminded discreetly that Williamsons Air Equipment is much more effective than old fashioned props—for plotting even a pampas.

WILLIAMSON
Manufacturing Company Limited
Photographic Engineers
LONDON
In Canada: Williamson Company of Canada Ltd., Toronto, Canada

FIRTH BROWN

1837–1950
EXPERIENCE & DEVELOPMENT IN HIGHEST QUALITY STEELS OF ALL GRADES

As manufacturers of Alloy Steels for High Duty, Firth Brown's contribution to industry is world wide, whether it be steels for engineering, shipbuilding, automobile, aircraft, road and rail transport or for the most minute mechanisms of the precision engineering industries. Firth Brown Steels were used in the production of the main propelling machinery forgings on the "Rangitane."

LIST OF PRODUCTS

Forgings—Light and Heavy, for special and general engineering.
Forged Steel Drums and Pressure Vessels.
Hardened Steel Rolls.
Carbon and Alloy Steel Bars and Billets.
Tyres and Laminated Springs.
High Speed and Tool and Die Steels.
Steel Castings.

Write for the Firth Brown Buyers' Guide for further particulars.

THOS. FIRTH & JOHN BROWN LTD., SHEFFIELD, ENG.

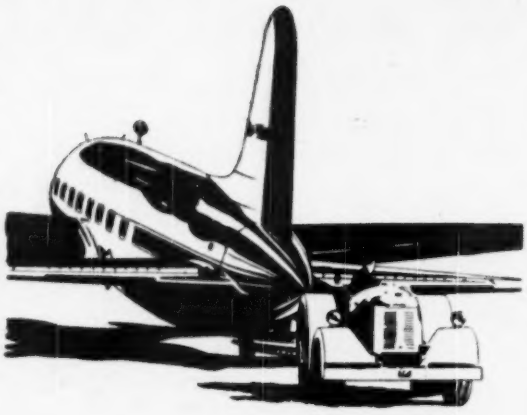
Ground Staffs know

that an aircraft spends more time on the ground than in the air.

Efficient air travel depends on smart ground organization, quick turn-around, speedy refuelling, freight loading—in short, economical handling at ground level.

That's the job of the David Brown TASKMASTER, designed for just this work, with its powerful 39 b.h.p. engine, rugged construction and 6-point towing hitch. With a fast top speed of 22 m.p.h. the TASKMASTER has a first gear drawbar pull of 3,500 lb. and complies with the Road Traffic Act.

Write for our leaflet DBT. 161 or better still, let us arrange a demonstration on your own airfield.



DAVID BROWN

Industrial Tractors

DAVID BROWN TRACTORS MELTHAM HUDDERSFIELD

There's much more in **good sheet metal work** besides a hammer and a lot of noise. We know, because for many years we have produced work **for the aircraft industry** to the most exacting requirements and, incidentally, to the user's complete satisfaction. This portable oxygen set container for British Overseas Airways Corporation is a typical example—perhaps our skill, experience and manufacturing facilities can help to solve one of your problems — whether it involves spinning forming, pressing or fabrication.

CORNERCROFT LTD.

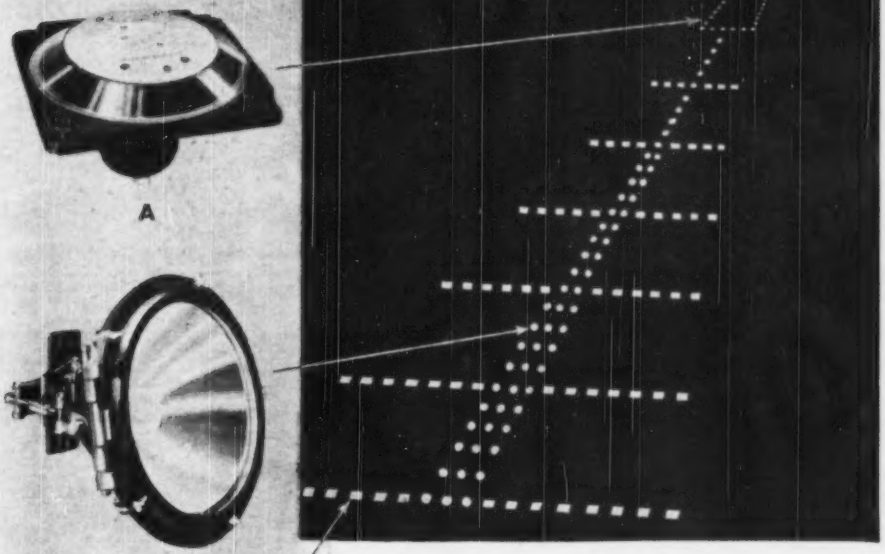
ACE WORKS, COVENTRY and 32, Clarges St., London, W.1. Telephone: Grosvenor 1646

Consult the **G.E.C.**

on

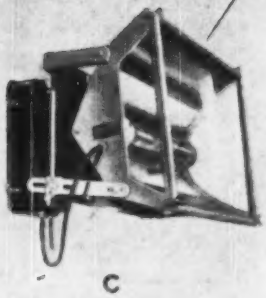
COMPLETE ELECTRIFICATION OF AIRPORTS

SPECIAL LIGHTING TO I.C.A.O. RECOMMENDATIONS



A

B



C

Three examples of G.E.C. Airport Lighting equipment designed for use in bad visibility are illustrated; the diagram showing how they are incorporated in a "Line and Bar approach" landing system.

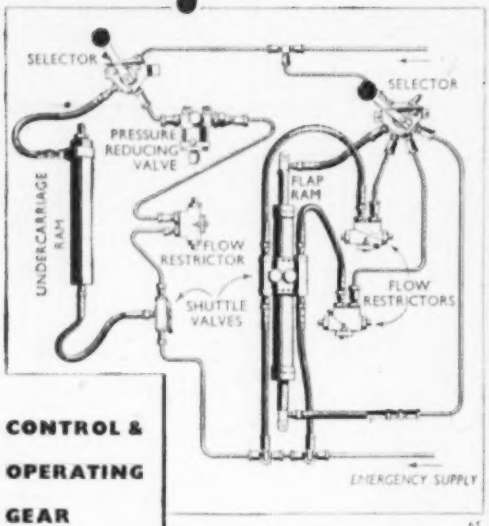
A. ZA 100 High intensity flush runway light.

B. ZA 405 High intensity centre line approach light.

C. ZA 407 Sodium approach light.

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2.

"Hymatic" AIR SYSTEM



65

CONTROL & OPERATING GEAR

In spite of the simplicity of the layout and the plumbing, this system has all the latest refinements. The flap gear is operated by a three-position ram, and there are flow-restrictor valves in both the lines to control both the lowering and raising speeds. The undercarriage 'down' circuit is similarly fed through a pressure-reducing valve to conserve air, and a flow-restrictor to give smooth and controlled operation even when gravity and the slip-stream are doing their worst. The emergency system is, of course, completely independent, using separate pipe lines and automatic shuttle-valves.

What other system can be so complete, so light and so very, very simple as air?

In the air, you can't beat air

THE HYMATIC ENGINEERING CO. LTD. REDDITCH WORCESTERSHIRE

"Service to Aviation"

STOCKS OF PROPELLERS AND BLADES NOW HELD AT WEYBRIDGE INCLUDE

Propeller No.	Engine	Aircraft
Z.971	Gipsy Major I	Miles Hawk, Monarch and Whitney Straight.
	Gipsy Major X	Miles Messenger IIA.
Z.973/2	Gipsy Major I	Miles Hawk, Monarch, Whitney Straight, D.H.90A (Dragonfly), Miles Falcon, Hawk Trainer.
Z.5280	Aeronca J.A.P.	Motor tutor.
Z.5600	Lycoming O-290-3	Auster V.
Z.5642	Cirrus Minor II	Auster VI.I.
Z.5800	Cirrus Minor I	Auster VI.I.
Z.5671	Gipsy Major X	K.Z.4.
Z.5672	Gipsy Major X	K.Z.4.
Z.5704	Cirrus Minor II	Miles Gemini.
Z.5721	Continental C.125-1	K.Z.III.
Z.5790	Continental C.85	Auster.
Z.6013	Cirrus Major III	Messenger, Aerovan.
Z.6014	Cirrus Major II	Messenger, Aerovan.
Z.6021-1	Gipsy Major I	K.Z.II.
Z.8010-1	Gipsy Major I.D	Messenger.
Z.8010-1	Gipsy Major 10	Christea Super Ace.
Z.8022	Cirrus Minor I	Auster J.4, Taylorcraft D.
Z.8040 (replacements for DES.86 CA69)	Warner super Scarab	Fairchild Argus I.
DH.5220/P	Gipsy Major I	DH.82(Tiger Moth) DH.82A (Tiger Moth Trainer).
DH.5220/H	Gipsy Major	As above and DH.83 (Fox Moth), DH.84 (Dragon).
DH.5232/A	Gipsy Major	DH.84 (Dragon), DH.85 (Leopard), DH.82A (Tiger Moth Trainer), DH.90A (Puss Moth), DH.83 (Fox Moth).
DH.5234/J	Gipsy Major I	DH.87B (Hornet), DH.85 (Leopard).
DH.5250/B	Gipsy Major I	DH.90A (Dragonfly).
DH.5250/K	Gipsy Minor	DH.94 (Moth Minor).

THESE PROPELLERS ARE COVERED WITH

WEYBRIDGE S

FOR LONG LIFE AND ARE

A.R.B. APPROVED

THE

AIRSCREW

CO., & JICWOOD LTD., WEYBRIDGE, SURREY

Telephone: Weybridge 1600 Telegrams: Airscrew, Weybridge

WORLD-WIDE RELIABILITY

by

Teddington CONTROLS

APPROACH MAPS BY COURTESY OF MESSRS. INTERNATIONAL AERADIO LTD.

MINGALADON AIRPORT (RANGOON)

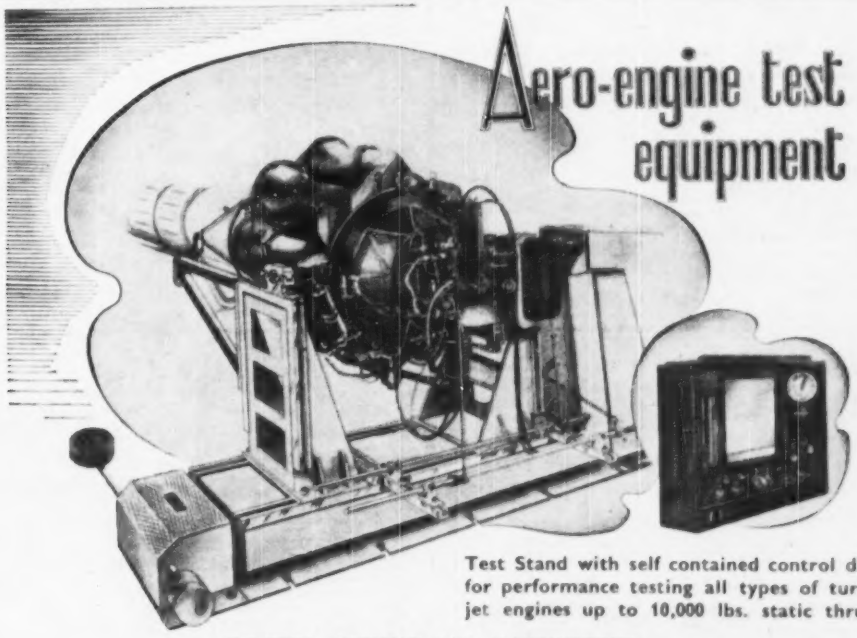
Lat.: 16° 54' 15" N. Long.: 96° 08' 30" E. Elev.: 100ft.
P.S.P. 1,900 x 50yds. Distance from Rangoon, 8 miles.
3 runways.

Electro-Pneumatic, Hydraulic and Fuel Valves, Pneumatic Jacks, Pressure Switches and Control Valves, Thermostatic Inching Controls, Cabin Heater and Temperature Control Equipment, Seamless Metal Bellows and Packless Glands, Time Switches.

TEDDINGTON CONTROLS LTD

CEFN COED MERTHYR TYDFIL SOUTH WALES

Aero-engine test equipment



Test Stand with self contained control desk for performance testing all types of turbo-jet engines up to 10,000 lbs. static thrust.

JOHN CURRAN LIMITED
CURRAN ROAD · CARDIFF

Telephone: CARDIFF 9191
Telegrams: NARRUC, CARDIFF

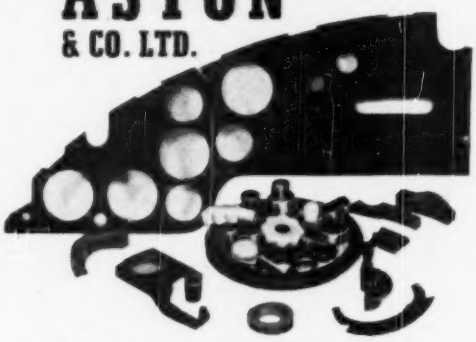
THE COLLEGE OF AERONAUTICAL AND AUTOMOBILE ENGINEERING
(The Chelsea College)

Complete practical and technical training for entry to Civil and Commercial Aviation or the Automobile industry.
Entry from School-leaving age.

Training for
AIRCREW TECHNICAL EXAMINATIONS
(Issue and Endorsements)

Syllabus from Bursar
Sydney Street, Chelsea, S.W.3.
Telephone : FLAxman 0021.

E. S. ASTON & CO. LTD.



MACHINISTS OF PLASTICS
(APPROVED BY A.I.D. & A.R.B.)

Instrument Panels, Cleats, Fairleads, Packings and Control Knobs, machined from Laminated Plastic and Cast resin.

5, SEBASTIAN STREET, LONDON, E.C.1.
Phone Clerkenwell 2179

tenacity

FOR THE AIRCRAFT INDUSTRY

Surridge's "G.P." Cements remain permanently tenacious in the face of all hazards of vibration, water, anti-freeze mixture, etc. Their powerful bonding action does not deteriorate with age and their enduring elasticity prevents any cracking or loosening. They are particularly recommended for the effective, trouble-free adhesion of rubber to metal, wood, fabric and linoleum.
For prices and samples, or specialist help with any adhesive problem in the Aircraft Industry, write to us today.

● *For the waterproof sealing of cupola panels, windows and screens, use* **SURRIDGE'S GLAZING COMPOUND Number 12.** *Resistant to vibration and anti-freeze.*

SURRIDGE'S PATENTS LTD
New Works,
Croydon Road
Elmers End,
Beckenham, Kent.
Tel : Beckenham 0160

SURRIDGE'S **G.P. CEMENTS**

BLACK, Number 11
WHITE, Number 11A

To complete the pleasure . .

Player's please

PLAYER'S NAVY CUT CIGARETTES · MEDIUM OR MILD

In the

DE HAVILLAND
"GOBLIN"
JET ENGINE

The shroud rings after 1,000 hours running test were still in perfect condition. Firth-Vickers "H.R. Crown Max" heat resisting steel was used for these rings.

FIRTH-VICKERS
HEAT RESISTING STEELS

FIRTH-VICKERS STAINLESS STEELS LTD., SHEFFIELD

Telephone No. Sheffield 42051

WYNN

Approved Stockists of all types of
AIRCRAFT
INSTRUMENTS
both British and American
also
AIRCRAFT ELECTRICAL ACCESSORIES

• *Immediate delivery in quantities* •
Released to A.I.D. or A.R.B. requirements

E. D. WYNN & CO.
INSTRUMENTATION ENGINEERS
MONTPELLIER DRIVE
CHELTENHAM

Telephone : 3264. Telegrams : Wynn, Cheltenham.

more and more
manufacturers
BRITISH & AMERICAN
specify

KING
FLUSH FITTING
HEAVY DUTY
TOGGLE ACTION
COWLING
FASTENERS

NO TOOLS REQUIRED FOR OPERATION.

FULL DETAILS FROM
KING AIRCRAFT CORPORATION
Fifth Street, Montreux Avenue, HILLINGDON, GLASGOW, S.W.
Telephone : HALFWAY 4571 (P.B.Ex.).

Sole concessionaires for U.S.A. and Canada :
Simmonds Aerocessories Inc., Tarrytown, New York.

Sole concessionaires for India and Pakistan :
R. K. Dundas Eastern Ltd., Jehangir Buildings, 133 Esplanade Road, Bombay

AIRCRAFT FOR SALE

TIGER Moth, completely overhauled, 12 months C. of A., £525.

GEMINI, choice of three; from £1,600.

DARTA fuselage, £17,000.

LOCKHEED Lodestar, 12 months C. of A., V.I.P., beautiful aircraft, £6,450.

ALL prices F.A.F., immediate delivery.

CENTRAL AERONAUTICAL BUREAU, Ltd., Croydon Airport. Croydon 3582 and 7744. Est. 112. [0620

R. K. DUNDAS, Ltd., Aviation Division, 29, Bury St., London, S.W.1.

FOR all aircraft and spares, aircraft and aerodrome equipment.

29, Bury St., London, S.W.1. Whitehall 2849. [0559

F. G. MILES, Ltd., Redhill Aerodrome, Surrey. Nutfield Ridge 2200.

MILES Gemini Mk. 1A airframe 430 hours, engines 500 and 260 hours, full B/F instr. vac. pump driven, mixture controls, F.P. 400 props. Murphy 2-channel V.H.F., exceptional finish inside and out, formerly the personal machine of Mr. F. G. Miles, C. of A. expiry April, 1951, overhauled and reconditioned by ourselves, £1,460.

MILES Gemini Mk. 1A airframe and engines under 100 hours total, dual flying controls, vac. pump driven B/F. instr., nav. lights, 55-watt generator, whip and H.F. aerial, C. of A. expiry June, 1951, highly recommended, £1,800.

MILES Falcon Six, to be sold ready to race for £550, an exceptionally fine example of this famous breed. Details upon request.

MILES Gemini Mk. 1A.—We are at present rebuilding one of these aircraft and installing zero-hour engine and F.P.400 propellers, full I.C.A.O. B/F. instr., vac. pump driven, nav. lights, landing lamp, mixture controls, air temp. gauges, screening for radio finish to customer's requirements, better than new, 12 months C. of A. and our guarantee, £1,995.

F. G. MILES, Ltd., Redhill Aerodrome, Surrey. Nutfield Ridge 2200. [0560

FOR sale, Auster Mk. V Ser. J.1, hours 150; first-class condition; recent C. of A.; £550 or best offer.

APPLY, West Midlands Erection Co., Ltd., Seacheils Lane, Willenhall, Staffs. [5565

HERCULES J.A.P. aircraft, dismantled, suitable for spares or rebuilding by enthusiast; seen near Portsmouth; offers.—Box 6185. [5350

MAGNIFICENT V.I.P. Proctor III for sale, a most beautiful aircraft, in perfect condition, total engine hours 65, airframe 1,119; best offer over £950.

CHRISLEA Super Ace series 3 for sale, total flying time 45 hours, 4-seater cabin aircraft, as new, best offer over £750.—Autocars (Worcester), Ltd., Aircraft Division, 51, Sidbury, Worcester. [0539

ALLEN AIRCRAFT SERVICES, LIMITED, Rapides, Queen 111 engines, Tiger Moth, special bargain, finished; silver, 12 months' C. of A.—Tel. Cro. 5444. [5368

PROCTOR V, finished silver, engine and airframe hours since new 500, V.H.F. radio, full instruments, etc., fully modified, with or without C. of A., any reasonable offer considered.

PATRICK MOTORS, Ltd., 479, Bristol Rd., Birmingham, 29. Selly Oak 1104. [0594

£750.—Consul, AI hrs. 1,729, e hrs. 712 and 750, A.R.I. 18076 radio, tr. 1,145 hrs., A.R.I. 18076 radio, with crystals, recessed; 450; atr. 9 radio with crystals, perfect condition; £100.—Box 6001. [3707

AVRO XIX, beautifully fitted, 10 seats, v.h.f. m.f. receiver, s.b.a. and radio compass, C. of A. expires May, 1951; reason for sale, This company have recently purchased Dakotas.—Box 6164.

TAYLORCRAFT Auster Plus "D," dual control, very nice condition, undercarriage damaged, engine hours since overhaul 205 hours 59 minutes, airframe hours 09 hour 42 mins.; must sell, £125.—Box 6395. [5396A

RAPIDE, 8 passenger seats, C. of A. to March 26, 1951, fully modified, in excellent condition, full radio equipment which will be removed if not required; £900 plus radio.—Boulding Airways, Spalding, Lincs. Tel. Spalding 2732. [5376

FIELDS.—Proctor I, recent C. of A., low hours, dual, v.h.f. multi-channel, leather upholstery, special exterior and interior finish; immediate delivery.—Offers to Field Aircraft Services, Ltd., Croydon Airport, Croydon, Croydon 7777. Cables, Fieldair, Croydon. [0258

W. S. SHACKLETON, Ltd., 175, Piccadilly, London, W.1. Now that the chaos caused by the B.A.C. show is over, Europe's leading aircraft dealers are settling down to the usual smooth trend of commerce. As usual there is a vast and varied selection of aeroplanes to offer and below we give examples of typical 'planes as a guide to current prices. C.I.F. quotations for deliveries to any part of the world will be sent immediately on request. Avro Ansons, £900–£1,500. D.H. Rapides, £1,900–£2,000. Airspeed Consuls, £1,400–£1,750. Vertiva Proctor Vs, £550–£650. Percival Proctor IIIs, £275–£480. D.H. Dove Executive, £9,750. Auster Autocrats, £445–£1,000. Fairchild Argus, £375–£700. Miles Messengers, £595–£1,500. Douglas Dakotas, £12,000–£16,000. Miles Gemini, £1,500–£2,000. Taylor Whitney Straight, £550–£650. Miles Magisters, £275–£375. D.H. Tiger Moths, £225–£700. Miles Aerovans, £475–£900. Tipsy Trainers, £225–£350. B.A. Swallows, £220–£275. Taylorcraft Plus "D," £275–£375. W. S. Shackleton, Ltd., 175, Piccadilly, London, W.1. Tel.: Regent 2448-9. Overseas cables: ShacKind, London. [0070

AIRCRAFT WANTED

MILES Gemini aeroplane with less flying hours wanted for purchase. If desired a Dehavilland K.Z.7 with four seats and 125hp Continental or a K.Z. with two seats, 100hp and Cirrus Minor motor can be offered as part of the payment; please send offers with complete information to Privates Advertising Agency, Copenhagen.—Box 7080. [5398

Rate 3/- per line, minimum 6/-, average line 6-7 words. Special rates: Auctions, Contracts, Patents, Legal and Official Notices, Public Announcements, Tenders, 4/- per line, minimum 9/- per paragraph. Box No., add 2 words, plus 1/- for postage and forwarding replies. Press day, last post Thursday. No responsibility accepted for errors. Remittances payable to — Iliffe & Sons Ltd., Dorset House, Stamford St., London, S.E.1.

AIRCRAFT WANTED

WANTED to buy for cash, Tipsy Belfair Type B or trainer in good condition, with or without C. of A.—Offers Box 6240. [5366

AIRCRAFT ACCESSORIES AND ENGINES

WANTED, propeller for Auster model D two-seater, also set of wings.—Details of condition and price to T. Shipside, Ltd., Parliament Street, Nottingham. [5397

HOME and overseas aircraft operators don't waste time and money unnecessarily, if in need of British and American instruments, electrical accessories and ancillary equipment, first contact

LITTO FLIGHTER AIDS, Station Approach, Boxmoor, Herts. Tel. Boxmoor 1564. Grams.: "Litco Flight Aids, Boxmoor, Herts." [0615

A/C ACCESSORIES & ENGINES WANTED

VENDAIR AIRCRAFT, Croydon Airport, will be pleased to hear from all stockists and private owners of surplus aircraft material. [0607

AIR CHARTER

BROOKLANDS AVIATION, Ltd. — Proctors and Rapides available for air charter at Brooklands Aerodrome, Weybridge. Byfleet 4350; Everell Aerodrome, Northampton (Tel. Moulton 21351); Shoreham Airport, Sussex (Shoreham 2566). [0506

AIRCRAFT SERVICING

BROOKLANDS AVIATION, Ltd., Brooklands Aerodrome, Weybridge.—C. of A. overhauls, modifications and conversions.—Tel. Byfleet 456. [0305

REPAIRS and C. of A. overhaul for all types of aircraft.—Brooklands Aviation, Ltd., Civil Repair Service, Sywell Aerodrome, Northampton. Tel. Moulton 3261. [0507

AUCTION

BY Order of the Sheriff of Surrey.

A PROCTOR III aircraft, fitted Gipsy Queen 2 engine, G-ALJH, to be sold by auction at Croydon Airport, Croydon, on Tuesday 26th September, 1950, at one o'clock, by Messrs. H. W. Smith & Mann.—Particulars from 6, St. James's St., W.C.1. (Hol. 9656). [5356A

CARAVANS

A CARAVAN chaos:

EX-EDITOR caravan paper, living in van 13 years, with U.K.'s biggest selection—all guaranteed with "free-van-for-faulty-one," would prefer it if you bought from U.K.'s most chaotic caravan business—his own! A vast chaos of vans (every well-known make!) chaotically laid out, a chaotic organisation where you'll be sent £500 by mistake, or asked for £100 when you don't owe it! But it all comes right in the end and you get perfection, human treatment, better h.p. terms, free rail fares for two if van bought (not applicable to Berkeley range), a real complete after-sales guarantee, including the help of The Caravan Residents' Association (A. S. Jenkinson, Secretary). So why not write for brochures to Head Office: A. S. Jenkinson, Bath Road, Taplow, Bucks. Tel. Maidenhead 5454. Open 9 a.m. to 8 p.m. including Sundays. Easy to reach—right on main A4 outskirts Maidenhead. Taplow 4½ miles, walk London Branch (equal selection and the only big caravan site in centre of London), corner Semley Place and Ebury Street, Victoria, S.W.1. Tel. Sloane 8119. Hours 9 a.m. to 8 p.m. 7 days a week. Victoria stn. 5 mins. walk. [0278

TUITION

ROCHESTER FLYING CLUB

OFFERS full club facilities and overnight accommodation to members; subscriptions £2.2 per annum, solo flying in Tiger Moth, Auster and Magister aircraft at £5 per hour and dual £5.5 per hour, one hour from London.—Tel. Bluebell Hill 212. [0595

A.S.T. Hamble is the world's premier civil aeronautical training establishment. [0327

AERONAUTICAL engineering.—Full-time practical and works training. Entrance by means of probationary term. Next term Oct. 3rd.—Syllabus from the Secretary, College of Aeronautical & Automobile Engineering, Sydney St., Chelsea, S.W.3. Flaxman 9021. [0019

SOUTHEND MUNICIPAL FLYING SCHOOL. Tel. Rochford 545204. No entrance fee or subscription. M.C.A. approved for 30-hour course for private pilot's licence; Auster and Proctor aircraft; solo from £2.18.0 per hour, dual from £3.3.0; Austers and Procter fitted with V.H.F. radio.

NIGHT flying in Austers £4.8.0 per hour dual or solo.

LINK trainer 10/- per hour; courses for R.T. operator's licence and instructor's endorsement.

FLYING instruction, commercial licence standard, restaurant and residential accommodation. [0552

SCHOOL OF NAVIGATION. University College, Warsash, Southampton. Flight navigator's course £16.10 for six months' tuition. Pilot licences £7/10 to £15.10 for six months' tuition. Link instruction; all approach systems, 10/- per hour or £5.10 for ten hours. Postal course. Hall of residence. [0957

SITUATIONS VACANT

SENIOR jig and tool designers required by well-known South Midland manufacturers of automobile and aircraft accessories; applicants should have Higher National Certificate or equivalent as well as good tool room or production shop experience; wide variety of work of interest to men with initiative; good working conditions; modern canteen, medical and sports and social activities; A.E.S.D. rates of pay, 5-day week; apply stating age, salary required and giving a detail of technical and practical experience in chronological order.—Box 6188. [5391

SITUATIONS VACANT

DRAUGHTSMEN, stressmen and tracers, good aircraft experience required for rapidly expanding programme of varied interesting work.

APPLY Portsmouth Aviation Developments, Ltd., The Airport, Portsmouth. [5370

JIG and tool draughtsmen, experienced, required for aircraft work; pension and life assurance scheme.—Apply Employment Manager, Vickers-Armstrongs, Ltd., Weybridge. [5357

GOOD senior draughtsman required for interesting programme of new work.—Apply in the first instance to the Chief Engineer, Percival Aircraft, Ltd., The Airport, Luton. [0593

APPLICATIONS are invited from design draughtsmen and stressmen, also technical assistants with combined design and performance experience for work on both reciprocating and gas turbine aero engines.

APPLICATIONS should state full particulars of experience and qualifications and should be addressed to The Personnel Manager, The de Havilland Engine Co., Ltd., Stonegrove, Edgware, Middx. [0575

REQUIRED B licence pilot with A & C engineers' licences, light aircraft area of operations, East Africa, very good salary paid to the right man.—Casper Air Charters, Box 2258, Nairobi, Kenya, E. Africa. [5562

BROOKLANDS AVIATION, Ltd., have vacancies for ex-R.A.F. or ex-R.N.A.S. electricians and woodworkers, good rates and working conditions.—Apply Brooklands Aviation, Ltd., No. 4 Site, Sywell Northampton. [0508

VICKERS-ARMSTRONGS, Ltd., Weybridge, invite applications from senior draughtsmen with aircraft experience, pension and life assurance scheme, write stating age, experience and salary required to Employment Manager. [5556

INTERNATIONAL company requires immediate applications for post of Flying Inspector (Pilot) in Pakistan under D.G.C.A.; current Civil Pilot's and Navigator's licences essential; salary Rs.2,200 per month.—Write Box 6394. [5395

GLOSTER AIRCRAFT Co., Ltd., require an experienced Aerodynamicist; good salary offered to the right man.—Apply, giving full details of age, experience, qualifications and salary required to the Chief Designer, G.A.C., Ltd., Hucclecote, Glos. [0577

APPLICATIONS invited from A, C and X engineers for a position as flight engineers on D.C.3 aircraft; must have wide experience on this type; flying experience an advantage but not essential.—Apply Sivewright Airways, Ltd., Ringway Airport, Manchester, Cutley 3211, Ext. 30. [5355

INSPECTOR (chief) required for auto and capstan work, experienced metrologist, including modern screw-thread technique, works in N.W. London; applications should give full particulars of experience and previous employment, together with age and salary required.—Box No. 6250. [5364

AIRSPEED, Limited, require aerodynamicist; experience of stability and control desirable; superannuation scheme, hostel accommodation available.—Apply, giving full details of age, experience, qualifications and salary required to Personnel Manager, Airspeed, Limited, Christchurch, Hampshire. [5365

APPLICATIONS are invited from senior and intermediate design draughtsmen, experience of aero engine design desirable but not essential; please write, stating age and giving details of previous experience in chronological order, to—The Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middlesex. [0449

AIRCRAFT DIVISION, ENGLISH ELECTRIC Co., Ltd., requires experienced aircraft design draughtsmen for a new design office which will be opened shortly in London; write sending full details of previous experience quoting reference 149 to—Central Personnel Services, English Electric Co., Ltd., 24-30, Gillingham St., London, S.W.1. [5369

APPLICATIONS are invited from senior stressmen with first-class qualifications desirous of working on new project of most interesting kind; excellent prospects of advancement for candidates with experience and enthusiasm.—Apply, stating experience, qualifications and salary required, to Chief Technician, Gloster Aircraft Co., Witcombe, Glos. [0440

VACANCIES exist for several engineers with university degree or its equivalent, for mechanical development of gas turbine aero engines; experience of similar work desirable, but not essential; salary in accordance with experience and qualifications.—Applications to Divisional Personnel Manager—Engines, The Bristol Aeroplane Co., Ltd., Filton House, Bristol. [5367

TEST house assistant required, must be under thirty with Inter. B.Sc. or Higher National Certificate and A.I.D. approved; experience must cover physical and mechanical testing of metals and structures; heat treatment and metallurgy of steels and non-ferrous metals; control of plating, pickling baths and similar processes to A.I.D. requirements.—Write stating age, qualifications and salary required, etc., to Personnel Officer, Westland Aircraft, Ltd., Yeovil. [5358

DESIGN draughtsmen with H.N.C. in mechanical engineering or equivalent and also detail draughtsmen are required for work in connection with the development of gas turbine engines; previous experience in this class of work is desirable, the positions are permanent and offer good prospects for advancement; the vacancies are at our factory in Burnley, Lancs., but applications quoting age, qualifications and experience should be made to Personnel Manager, Joseph Lucas, Ltd., Great King St., Birmingham, 19. [5354

PHYSICIST (male) required in research and development laboratory of large well-known concern; essential qualifications, should be graduate in physics with high standard of mathematics and have had some experience in industry; work will mainly be on development of mechanical, thermal and electrical equipment of precision nature; applicants should give full details of age, training and experience (in chronological order) and indication of salary required; only those who conform to requirements of advertisement need apply.—Box 6249. [5372

Printed in Great Britain for the Publishers, Iliffe & Sons Ltd., Dorset House, Stamford Street, London, S.E.1, by The Corinthian Press Ltd., Paris Garden, London, S.E.1. *Flight* can be obtained abroad from the following: Australia and New Zealand: Gordon & Gotch, Ltd. Canada: The Wm. Dawson Subscription Service, Ltd. South Africa: Central News Agency, Ltd. United States: The International News Co. Entered as Second Class Matter at the New York, U.S.A., Post Office.

'Special' becomes standard

These light-weight single-thrust Timken tapered-roller bearings are now standard.

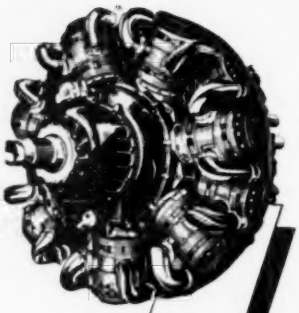
They resist thrust loads with a minimum of deflection, while still retaining the self-centring effect inherent in the tapered-roller bearing.

TIMKEN

Regd. Trade Mark: TIMKEN

tapered-roller bearings

BRITISH TIMKEN LTD., BIRMINGHAM, AND DUSTON NORTHAMPTON
Telephone: East 1321 Telegrams: "Britimken," Birmingham
Subsidiary Company: Fischer Bearings Company Ltd., Wolverhampton, makers of FBC ball and roller bearings and transmission equipment.



HERCULES ENGINES

1000

1,000 hours between overhauls . . .

The Hercules 634 engines used in Viking aircraft operated by Airwork Limited have now been approved by the Air Registration Board for 1000 hours operation between overhauls.

The previous approved life between overhauls was 900 hours and the extension to 1000 hours is the result of operating a trial batch of engines for this longer period. "Bristol" sleeve-valve engines run for their full period between overhauls without any attention apart from routine service maintenance of plugs, filters, etc. There is no top overhaul, and the full 1000 hours is completed without removing or changing any cylinder heads or pistons.

A notable feature of the steady improvement in overhaul life of these engines is the high proportion of the maximum permissible overhaul life that is achieved. Some operators have reached a figure as high as 97%, and the average of all operators is about 91%. All engine changes, irrespective of the reason, are included in these figures.

The excellent reliability and economy achieved in service by the Hercules engine has given the sleeve-valve engine a high reputation among civil operators, and once again proves the suitability of Hercules and Centaurus engines for transport type aircraft.

1,000 hours between overhauls is equivalent to more than 2½ flights round the world.

THE "Bristol" AEROPLANE COMPANY LIMITED ENGLAND